THE

DOMESTIC ENCYCLOPÆDIA;

OR,

A DICTIONARY OF FACTS,

AND USEFUL KNOWLEDGE.

COMPREHENDING

A CONCISE VIEW OF THE LATEST DISCOVERIES, INVENTIONS, AND IMPROVEMENTS,

CHIEFLY APPLICABLE TO RURAL AND DOMESTIC ECONOMY.

TOGETHER WITH

DESCRIPTIONS OF THE MOST INTERESTING OBJECTS OF NATURE AND ART; THE HISTORY OF MEN AND ANIMALS, IN A STATE OF HEALTH OR DISEASE; AND PRACTICAL HINTS RESPECTING THE ARTS AND MANUFACTURES, BOTH FAMILIAR AND COMMERCIAL.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS AND CUTS.

IN FIVE VOLUMES.

VOLUME V.

BY A. F. M. WILLICH, M.D.

AUTHOR OF THE LECTURES ON DIET AND REGIMEN, &c. &c.

FIRST AMERICAN EDITION; WITH ADDITIONS,

APPLICABLE TO THE PRESENT SITUATION OF THE UNITED STATES:

BY JAMES MEASE, M.D.

AND FELLOW OF THE AMERICAN PHILOSOPHICAL SOCIETY.

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District of Pennsylvania: to wit.

Be it remembered, That on the eighth day of April, in the twenty-seventh Year of the Independence of the United States of America, William Young Birch, and Abraham Small, of the said District, have deposited in this Office the Title of a Book, the Right whereof they claim as Proprietors, in the words following, to wit:

"The Domestic Encyclopædia; or, A Dictionary of Facts, and Useful "Knowledge. Comprehending, a concise View of the latest Dis-"coveries, Inventions, and Improvements; chiefly applicable to "Rural and Domestic Economy. Together with Descriptions of the "most interesting Objects of Nature and Art; the History of Men "and Animals, in a State of Health or Disease; and practical "Hints respecting the Arts and Manufactures, both familiar and "commercial. Illustrated with numerous Engravings and Cuts. "In Five Volumes. Volume I. By A. F. M. Willich, M. D. "Author of the Lectures on Diet and Regimen, *&c. &c.* First "American Edition; with Additions applicable to the present situa-"tion of the United States. By James Mease, M. D. and Fellow of "the American Philosophical Society."

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(L. S.) D. CALDWELL,

Clerk of the District of Pennsylvania.

CONTENTS

OF THE FIFTH VOLUME.

	PAGE
SNUFF - -	1
Soal - -	2
Soap - -	*ib.*
...... Earth -	5
...... Wort - -	*ib.*
Soda - -	*ib.*
Soft-grass -	6
Soil - -	7
Soiling - -	*ib.*
Solidago -	8
Solomon's Seal - -	*ib.*
Soot - -	9
Sorrel, the Common	*ib.*
.... the Sheep's -	10
.... the Wood -	*ib.*
Soup - -	*ib.*
Sow-bread - -	11
Sow-thistle -	*ib.*
Sowing - -	12
Soy - -	*ib.*
Spade, (with a Cut,)	13
Spar - -	14
Sparrow -	*ib.*
Spasm - -	15
Spatling-Poppy, - -	16
Spearwort, the Great, -	*ib.*
.... the Lesser, - -	*ib.*
Spectacles, - -	*ib.*
Speedwell, - -	17
Spencer, Marine, -	18
Spermaceti, - -	19
Spice, - -	20
Spider, - -	22
Spider-Wort, -	23
Spignel, - -	*ib.*
Spike-Oil, -	24
Spinach, - -	*ib.*
Spindle-Tree, -	*ib.*
Spinning, -	25
Spirits, - -	26
Spirit of Wine, -	27
Spleen, -	*ib.*
Spleen-Wort, -	28
Splents, - -	*ib.*
Sponge, -	*ib.*
Spots, - -	29
Sprain, - -	*ib.*
Spring, -	30
Spring-Grass, -	*ib.*
Spruce-Beer, -	31
Spurge, - -	*ib.*
Spurge-Laurel, -	32
Spurry, - -	*ib.*
Squill, - -	*ib.*
Squinting, -	33
St. Vitus's Dance, -	34
Stable, -	35
Staggers, -	*ib.*
Stair Case, - -	36
Star-of-Bethlehem, -	37
Star-Grass, -	*ib.*
Star-Wort, -	*ib.*
Starch, - -	*ib.*
Starling, - -	39
Staves-Acre, - -	*ib.*
Stays, -	*ib.*
Steam, - -	40
Steam-dish, -	41
Steel, - -	43
Steel-Yard, -	44
Stirrup, - -	*ib.*
Stomach, -	45
Stone, - -	46
Stones, (with a Plate),	49
Stone-Crop, -	51
Storax, -	*ib.*
Stove, - -	52
Strains, -	53

	PAGE
Strangles,	54
Straw,	55
Strawberry,	56
Strawberry-Tree,	59
Straw-Cutter,	60
Sturgeon,	62
Styptic,	*ib.*
Sublimate,	*ib.*
Succory,	63
Suffocation,	*ib.*
Sugar,	*ib.*
Suicide,	73
Sulphur,	74
.... Wort,	75
Sumach-Tree,	*ib.*
Sundew,	*ib.*
Sun-Flower,	76
Sun-Scorched,	77
Surfeit,	*ib.*
.... in Farriery,	*ib.*
Suspension, by the Cord,	78
Swallowing,	79
Swallow-Wort,	*ib.*
SWAMP,	80
Sward-Cutter,	*ib.*
Swearing,	*ib.*
Sweat,	81
Sweating-Sickness,	*ib.*
SWEEP-CHIMNEY,	*ib.*
Swimming,	82
Swinging,	83
Swoon,	84
Sycamore-Tree,	85
Sympathy,	*ib.*
Syrup,	86
Tacamahaca,	87
Talc,	*ib.*
Tanning,	88
Tansy,	90
TAP-COCK,	*ib.*
Tape-Worm,	91
Tar,	92
Tarragon,	94
Tarras,	*ib.*
Tartar,	*ib.*
Taste,	95
Tea-Tree,	*ib.*
Teasel,	98
Teeth,	*ib.*
Telescope,	101
Temperance,	102
Tendons,	*ib.*
Tennis,	103
Terrier,	*ib.*
TETRAO,	*ib.*
Theatre,	104
Thermometer,	105
Thirst,	112
Thistle,	*ib.*
.... the Cotton,	113
Thorn-Apple,	*ib.*
Thrashing,	114
Thrift,	*ib.*
Throat,	115
Throstle,	*ib.*
Thrush,	*ib.*
Thunder,	116
Thyme,	117
Tide,	118
Tile,	119
Tillage,	*ib.*
TILIA,	120
Timber,	*ib.*
Time,	138
.... Piece,	*ib.*
Timothy-Grass,	139
Tin,	140
Tincture,	142
Tinning,	143
Toad,	*ib.*
Tobacco,	144
Tolu,	152
Tom-Tit,	*ib.*
Tongue,	153
Tonsils,	155
Tool,	*ib.*
Tormentil,	*ib.*
Tortoise,	156
Touch-Wood,	*ib.*
Tourniquet,	*ib.*
Tower-Mustard,	151
Tragacanth,	*ib.*
Transfusion.	*ib.*
Transplantation,	159
Traveling,	*ib.*
Treacle,	189
Tree,	190
Tree-Mallow,	193
Trefoil,	*ib.*
.... the Common,	194
Truffle,	199
Tumbrel, (with a Cut),	200
Tumor,	201
TUPELO TREE,	*ib.*
Turbith,	202

	PAGE		PAGE
.... Mineral, -	202	Washing, - -	344
Turf, - -	ib.	Wasp, - - -	345
Turkey, - -	ib.	Water, (with Cuts and a plate),	346
Turmeric, -	203	Water-Aloe, -	359
Turnep, (with Cuts), -	ib.	.... Caltrops, -	ib.
Turning, -	215	.... Closet, - -	360
Turnsol, - -	216	.... Cladiole, - -	ib.
Turpentine, -	217	.... Pepper, -	ib.
Turtle - -	ib.	.... Proof, - -	361
Tutenag, -	218	Wax, - - -	362
Tutsan, - -	ib.	Weaning, - -	363
Types, - -	ib.	Weasel, - - -	ib.
Typhus, - -	219	Weasel-Snout, - -	364
		Weather, - -	ib.
Valerian, - -	221	Weather-Glass, - -	365
VALISNERIA, -	222	Weaving, - - -	366
Vanilla, - -	223	Weed, - - -	ib.
Vapour, -	ib.	Weigh, - - -	368
Varnish, - -	224	Weights, (to raise) -	ib.
VAULT, - -	234	WEIGHT, - - -	369
Veal, - -	ib.	WEIGHING-BRIDGE,	371
Vegetable Kingdom, -	235	Well, (with a Cut), -	372
Vegetation, -	261	Wen, -	377
Veins, - -	267	Whale, - - -	378
Veneering, -	ib.	Wheat, (with a Cut), -	379
Verdigrease, -	275	Wheel, - - -	392
Verditer, - -	276	Whetstone, - -	402
Verjuice, - -	ib.	Whey, - - -	ib.
Vervain, - -	277	Whin-Chat, - -	ib.
VESSEL, -	ib.	Whiskey, - - -	403
Vetch, or Tare. -	279	White-Swelling, -	ib.
.... the Chickling,	284	White-Washing, - -	404
.... the Corn, -	285	Whiting, - -	ib.
Vine, - -	ib.	Whitlow, - - -	405
Vinegar, - -	325	.... Grass, -	ib.
Violet, - -	327	Widgeon, - -	ib.
Viper's Bugloss, -	ib.	Willow, - -	406
Vitriol, - -	ib.	.... Herb, - -	409
Vives, - -	328	Wind, - -	ib.
Ulcer, - -	329	.... in Horses, - -	410
Vomiting, -	332	Wind-Gall, - -	411
Usquebaugh, - -	334	.... Instruments, -	412
Uvula, - -	ib.	Windmill, (with a Cut),	ib.
		Wind-Pipe, - -	413
Waggon, - -	335	Window, (with a Cut,)	414
Wainscot, - -	339	Wine, - - -	416
Wake-Robin, -	ib.	Winnow, - -	420
Wall-Cress, - -	ib.	Wire, - - -	422
Walnut-Tree, -	ib.	Withers, - -	ib.
Warbles, - -	342	Woad, - - -	ib.
Warmth, (with a Cut),	ib.	Wolf's-Bane, - -	423
WARPING, - -	343	Wolves-Teeth, - -	424
Warts, - -	344	Wood, - - -	ib.
Wart-Wort, - -	ib.	Woodcock, - - -	428

	PAGE		PAGE
Wood-pecker, - -	428	Yard, - - -	449
Woodroof, - - -	430	Yarn, - -	*ib.*
Wool, - - -	*ib.*	Yarrow, - -	450
Worms, - - -	437	Yawning, - - -	*ib.*
.... in Husbandry,	438.	Yeast, - -	451
Wormwood, - -	*ib.*	Yellow, - -	457
Wort, - - -	439	Yellow-Fever, - -	458
Wound, - -	*ib.*	Yellow-Hammer, -	465
Wounds, in Farriery, -	443	Yellow-Rattle, - -	*ib.*
Woundwort, - -	*ib.*	Yellows, - -	*ib.*
Wren, - - -	444	Yew-Tree, - -	468
Wrestling, - -	*ib.*	Yoke, - -	470
Writing, - -	*ib.*	Youth, - - -	*ib.*
Wry-Neck, - -	445		
		Zaffre, - - - -	473
XANTHOXYLON, -	446	Zedoary, - - -	474
XANTHORHIZA, -	447	Zinc, - - - -	*ib.*
Yam, - -	448	Zizany, - - -	476

PLATES IN THE FIFTH VOLUME.

I. Plate of a Machine for clearing stones from land; and of a Straw-Cutter, to face p. 49.
II. Munning's and Knight's Turnip-Drills, and Transplanter, p. 205.
III. Searjant's Machine to raise water; and Besant's Undershot Wheel, p. 352.
IV. Hoisting Machine, p. 368.
V. & VI. Weighing Bridge, p. 371.
VII. Xanthorhiza Tinctoria, p. 448.

INDEX

TO THE CORRESPONDING SYNONYMS, OR INVERSIONS OF TERMS, OCCURRING IN THE FIFTH VOLUME.

Sole; see Soal.

Somnambulism; see Sleep-walking.

Sour-trefoil; see Sorrel, the Common.

Spanish Fly; see Fly, the Spanish.

Spanish Lilac; see Lilac, the Common.

Spear-thistle; see Thistle.

Spelt; see Wheat.

Spicknel; see Spignel.

Spinell; see Ruby.

Spunk; see Touchwood.

Square Barley; see Bere.

Squash; see Gourd.

St. James's Wort; see Ragwort, the Common.

Starwort, the Water; see Star-grass.

Stinking Flower-de-luce; see Flower-de-luce.

Storm-glass; see Weather-glass.

Strasburgh-turpentine; see Turpentine.

Strawberry-trefoil; see Trefoil.

Stricken; see Quarter-evil.

Suffolk, or Skim-cheese; see Cheese.

Sugar-cane; see Sugar.

Sulphuric-acid; see Vitriolic-acid.

Summer-barley; see barley.

Sun-fish; see Shark, the Basking.

Sweet-cicely; see Cicely, the Sweet.

Swine-pock; see Chicken-pock.

Swine's-cress; see Scurvy-grass.

Swiss-cheese; see Cheese.

Sympathetic Ink; see Ink.

Tangle; see Sea-wrack, the Esculent.

Terras; see Tarras.

Threshing; see Thrashing.

Tine-tare; see Vetch, the Corn.

Tombac; see Zinc.

Traas; see Tarras.

Tree-moss; see Liverwort, the Officinal Stringy.

Trefoil-buck-bean; see Buck-bean.

Venice-turpentine; see turpentine.

Venice-treacle; see Treacle, the Venice.

Wakefulness; see Waking.

Water-chickweed; see Star-grass.

Water-crow-foot; see Crow-foot.

Water-crow-foot, the Round-leaved; see Crowfoot.

Water-dropwort; see Dropwort.

Water-fennel; see Star-grass.

Water-flower-de-luce; see Flower-de-luce.

Water-rat; see Rat.

Water-starwort; see Star-grass.

Watering of Gardens; see Kitchen-garden.

Way-thistle; see Saw-wort.

Weeping-willow; see Willow.

Westphalia-cheese; see Cheese.

Wey; see Weigh.

Whipt-syllabub; see Syllabub.

Whistling-swan; see Swan, the Wild.

Whitloe; see Whitlow.

Wild-basil; see Thyme.

Wild Burnet; see Burnet, the Great.
Wild-liquorice; see Milk-veteh.
Wild-thyme; see Thyme.
Willow, the Sweet; see Gale, the Sweet.
Willow-herb, the Hooded; see Scull-cap, the Common.
Willow-herb, the Purple-spiked; see Loose-strife, the Purple.
Wiltshire-cheese; see Cheese.
Winnowing-machine; see Winnow.
Wolf's-bane, the Great; see Leopard's-bane.
Wood-strawberry; see Strawberry.
Wormseed; see Mustard, the Common Hedge.
Wort-cress; see Scurvy-grass.
Yellow Bed-straw; see Cheese-rennet.
Yellow Dead-nettle; see Weasel-snout.
Yellow Gum; see Gum.
Yellow-flag; see Flower-de-luce.
Yellow Hercules; see Xanthoxylon.
Yew-leaved Fir; see Fir-tree.
Yorkshire Sanicle; see Butter-wort.
Zanthoxylon; see Xanthoxylon.

ERRATA.

Page 38, column 2, line 14 from bottom, *for* mashed *read* washed. Page 80, col. 2, line 10, after recovering, *read* swamps. Page 124, col. 1, line 17 from bottom, before "Mr. Bordley," add a [, and another at the end of the paragraph. Page 357, col. 2, line 15 from bottom, in some copies, *for* In, *read* For. Page 409, col. 1, line 14, *for* Juassia, *read* Quassia.

THE

DOMESTIC ENCYCLOPÆDIA.

S.

SNUFF, a well-known preparation, the basis of which is *tobacco*, reduced to powder; other matters being incorporated, with a view to impart a degree of pungency and peculiar odour.

It would be an endless task, to enumerate the various compounds that have been introduced to the notice and patronage of the public, in different countries: hence we shall only remark, that there are *three* principal kinds of snuff, which are known under the names of *granulated; impalpable;* and the *bran*, or the coarse part remaining after the second sort has been sifted.

The practice of taking snuff, though less detrimental to health, is not less whimsical than that of SMOKING; for, if continued to excess, it occasions such a copious discharge of mucus from the nostrils, as will eventually impair the sense of smell, sometimes even corrode the membrane lining the nose, and occasion deep ulcerations in that organ. An instance occurs in the *Transactions of the Learned, (Acta Eruditorum)*, for the year 1715, of a person who, by his extravagant use of snuff, at length was troubled with a polypus in the æsophagus, which rendered him unable to take any nourishment, and literally *starved* him. Another consequence of indulging in this singular custom is, that it frequently affects the *voice;* for, as a kind of stricture is thus induced at the base of the nose, which communicates its influence to the palate and organs of speech, the votary of such custom is consequently stimulated to take additional quantities, in order to remove the obstruction.

The occasional and moderate use of snuff, however, is in some cases beneficial. Thus, if a person be subject to head-ach, or to diseases of the eyes, or ears, a few grains of such powder will often afford speedy relief, in consequence of instantaneous sneezing. On the other hand, we would advise those who know the satisfaction of cleanliness, to avoid as long as possible,

the taking of snuff; and such as are liable to phthisical complaints hemorrhages, or internal ulcers, should be particularly cautious; as the indulgence of this practice might, to them, be productive of fatal consequences.

SOAL, or SOLE, *Pleuronectes solea*, L. a fish that abounds on the British coasts, and is of various sizes; those taken on the western shores weighing from six to seven pounds each; while such as are caught on the eastern coast, seldom exceed one, or at the utmost, two pounds in weight. The upper part of its body is of a deep brown colour, and the belly is perfectly white.

Soles are highly esteemed on account of their delicate flavour; the facility with which they are digested; and the rich nutriment they afford: these good qualities, however, are supposed to decrease in proportion to their larger size. Hence, the most diminutive are justly preferred; but they ought to be dressed as soon as possible, because their delicacy is impaired by keeping.

SOAP, a composition of fixed alkaline salt, in a state of combination with animal or vegetable oil: it is sometimes dry and hard, at others soft and liquid; being manufactured in various ways, with and without heat; but, as these depend on the same principle, we shall state only the common methods.

Where large quantities of soap are to be formed, heat becomes indispensable. For this purpose, a ley is made of soda and quick-lime, in the proportion of four parts of the former to one of the latter; and which is sufficiently strong to bear an egg. Equal parts of such ley, and of some tallow, or oil, are next poured into a copper, placed over a gentle fire, and stirred continually, till they begin to unite; when the rest of the ley is added, and the agitation continued, till the ingredients be completely incorporated. The mixture is next *cast* into proper vessels, at the bottom of which a little pulverized chalk is spread, to prevent it from adhering: and, in a few days, the soap acquires a sufficient degree of consistence, to be taken out, and formed into oblong squares.

Such is the process by which the various kinds of soap are manufactured; the only difference being in the oils employed in the composition. Thus, the common hard soap is prepared from the caustic ley above-mentioned, with the addition of tallow. The *Venice*, *Alicant*, or *Spanish* Soap, with olive-oil; *Green* Soap with that of rape, hemp, or linseed; *Black* Soap with train-oil; and, lastly, the ordinary *Soft* Soap is formed by using pot-ash as a substitute for soda, together with tallow, or train-oil; to which is added a large quantity of common salt......The perfumed compounds, known under the names of Palm, Violet, Almond, or other Soaps, are prepared in a similar manner; the oils of such vegetable substances being employed, instead of those of the usual kind.

The vegetable oils, as well as the fat of animals, generally consumed in the manufacture of soap, raising this article to a high price, experiments have successfully been made, with a view to substitute *fish-oil*. The only objection to its general use, is a disagreeable smell, of which it cannot be easily divested.....With a similar design,

CHAPTAL has proposed to employ *wool*. He directs ("*Annales de Chimie*," vol. 21) the ley to be prepared in the usual manner, and made boiling hot; when shreds or rags of any kind of woollen cloth are to be gradually thrown in, and they will be speedily dissolved..... Fresh portions are then to be sparingly added; the mixture must be constantly agitated: when no more of the woolly substance can be dissolved, the soap will be ready; and when cool, is fit for use. ....This compound has been tried in washing, and found to answer the same purposes as common soap: we therefore conceive, it might be advantageously substituted for that expensive article, in numerous families; provided the rags could be obtained in sufficient quantities, and at a reasonable price.

As various frauds are practised by the manufacturers, and especially by the retailers of soap, by adding ingredients that increase its weight, but diminishes its value, we deem it our duty, to give a few hints for detecting such impositions. The liquor, generally employed for such nefarious purpose, is a strong brine made of common salt and water, which may be added to soap formed of tallow (the ingredient principally used in the manufactories of Britain), without rendering it softer, or less consistent. In order to prove this adulteration, it will be sufficient to expose a piece of the suspected soap to the air, for several days, when the water will evaporate, and the quantity thus fraudulently added, may be accurately ascertained, by the diminished weight of the soap. Several other methods have been contrived for corrupting this article, but these being neither so lucrative as that before stated, nor generally known, we are not disposed to propagate such knowledge. Hence we shall proceed to review the principal patents that have been granted to speculators in this article; and next explain the uses to which soap may be applied.

In November, 1790, Mr. SAMUEL PUGH obtained a patent, for a method of preparing oils for manufacturing hard soap, either with, or without the aid of any tallow, or other grease, at a cheaper than the usual rate. His process however, is too complex to be understood, excepting by manufacturers: the inquisitive reader will, therefore, consult the 2d vol. of the *Repertory of Arts*, &c. where a diffuse specification is inserted.

In July, 1800, a patent was granted to Mr. JOHN CROOK, for a method of making soap, by means of the volatile, mineral, and vegetable alkalies, &c. His invention consists in extracting the volatile alkali from urine, either by distillation, or in its raw state; and rendering it caustic by means of unslacked lime, in the proportion of one pint to eight of raw urine. These are poured into a cask for 6 or 8 hours, when the clear liquor is drawn off, and incorporated with the common materials for making soap. The patentee likewise employs such alkaline ley, and also the raw urine, for the purpose of strengthening the ordinary soap, so as to impart to it greater clearness and solidity. He farther observes, that such urinous lixivium may be profitably applied to the cleansing of raw goods from the unctuous matter with which they

are impregnated; by boiling the liquor, and causing the steam that arises from the volatile alkali in a state of vapour, to pass into close vessels, in which such goods are suspended.

Soap is one of the most valuable articles in domestic economy: its uses in various manufactures require no description. The ashes, refuse, or waste, remaining after this compound is made, furnish an excellent *manure*. (See ASHES.) The suds, or water, in which soap has been dissolved, are of great service to gardeners; as they effectually destroy INSECTS in hothouses. (See also vol. 3. p. 331 and vol. 4. p. 110.) Farther, it appears from a patent granted, in June, 1780, to Mr. SAMUEL UNWIN, and which is now expired; that *soap-suds*, after being used in scowering, washing, &c. may be rendered sufficiently strong to serve the same purpose, repeatedly, and even for the *re-production* of soap. He directs any quantity of the suds (when rendered useless by the foul or greasy matters they may hold in solution) to be boiled over a brisk fire; in consequence of which, a scum of grease, oil, &c. will rise to the surface. This must be saturated or dissolved, by the gradual addition of pot-ash, or similar alkaline salt; the whole being stirred, till the scum disappear. The soap-suds, thus corrected, are now to boil for two hours, when the fire must be discontinued, in order that all feculent or earthy particles may subside. The liquor will then be found sufficiently purified, and may again be employed for scowering, &c. every time repeating the process before described. In order to make soap of such *rectified* suds, the patentee directs any quantity to be drawn off into shallow vessels, in which it must be evaporated over the fire, till it acquire a due consistence; and, by adding the usual proportion of sea-salt, the mixture will become hard, and possess all the properties of saponaceous matter.

Soap is also of considerable utility in medicine: for this purpose, however, it is prepared without the aid of heat; the ley being filtred and concentrated by evaporation, to such a degree, that a phial capable of holding an ounce of water, will contain one ounce and 216 grains, or nearly $1\frac{1}{2}$ oz. of such lixivium. One part of the latter is then mixed with two parts of the oil of sweet-almonds, or of olives, in a stone vessel; the ingredients are occasionally stirred; and, in the course of a week, a firm white soap will be obtained. ....This compound is reputed for its efficacy in dispelling *calculi*, or stones, in the human body; and, when dissolved in ale, it has with advantage been administered in the jaundice. BOERHAAVE always prescribed it with resinous pills; as it contributes to decompose them in the stomach. But, of late years, soap has fallen into disrepute, and is now seldom employed in medicine; though we are informed by M. BELLOT, that soap-water has been given, with the happiest effects, to persons bitten by mad animals.

There are numerous vegetables, that may afford proper *substitutes for soap*, in its various applications to domestic uses; but, as many of these have already been pointed out; and others will occur in the

subsequent pages; we refer the reader to our *General Index of Reference.*

SOAP-EARTH, or *Steatites*, L. a species of fossil, which abounds in Devonshire, Cornwall, and the islands in the vicinity of the *Lizard Point*. [It also abounds on the river Schuylkill, near Philadelphia.] It is generally of a white, or grey colour, intermixed with greenish or yellowish shades; is composed of very fine particles; of a firm, equal, and regular texture: and is very heavy. Its surface is smooth and glossy; it feels soft and greasy; and neither melts in the mouth, nor adheres to the tongue, or stains the fingers.

This mineral may be formed into a paste with water, which is easily worked on the potter's wheel; and if, thus manufactured, it be exposed to an intense heat, it becomes so hard as to emit fire, when stricken against steel.

The soap-earth possesses similar properties with Fuller's-earth, and is employed for the purpose of cleansing woollen cloths from grease: it does not, however, work so easily as clays; and, when digested with vitriolic acid, it forms a salt somewhat resembling that obtained by evaporating Epsom-water.

SOAP-WORT, the COMMON, or BRUISEWORT, *Saponaria officinalis*, L. a native perennial, growing in meadows and hedges; flowering in July and August.....The leaves possess a disagreeable bitter taste: if bruised and agitated with water, they produce a saponaceous froth, which may serve for removing greasy spots from linen, as well as woollen cloths; but it discharges no colours....The roots are somewhat pungent, have a sweetish taste, and in smell resemble those of liquorice: a strong tincture may be prepared, by digesting them in rectified spirits....In medicine, this plant is now exploded; but, in domestic economy, the sap expressed from the root, stalk, and leaves, may be employed as a substitute for *soap*, in cleansing raw or coarse cloth, and likewise for fine linen, in the washing of which, it will save at least one-half of that expensive article, otherwise required....Lastly, the admirers of winged insects may catch the most beautiful butterflies on the flowers of the common soap-wort, which are visited by them during twilight.

SODA, FOSSIL, or MINERAL ALKALI, a peculiar salt, which is found native in various parts of the world; but, as the quantity thus obtained, is inadequate to its extensive consumption, various methods have been devised, for procuring it from sea-salt; and also by the burning of the salt-wort, together with other saline plants, which grow in the vicinity of the sea-coast...See BARILLA, and FOSSIL ALKALI.

Few articles are of greater importance to the arts, manufactures, and domestic economy, than soda. It is indispensably necessary for making *hard* soap; and also forms an excellent substitute for this article: as four ounces of the former, and six of the latter, are fully equal to 16 ounces, or one pound of soap, for cleansing 14lbs. of cloth, by hand; while it softens the hardest water: thus, a saving will arise in the expence of from one-third to one-half, accordingly as that operation is performed by the hand, or by machines....The superior effects of soda are fully

evinced in the cleansing of fleecy hosiery, flannels, or worsted stockings; which, when managed with warm water, soap, and pot-ash, acquire an unpleasant odour, and are apt to shrink, in consequence of the rubbing, particularly if they be immersed in cold water: whereas, by using the fossil alkali, these inconveniencies are said to be completely avoided, and neither the quality of the goods will be impaired; nor the hands of women, when the soda is judiciously employed, be injured in the same manner, as generally happens by the common ley.

Farther, as frequent bathing or washing of the body greatly conduces to health, it has been recommended to dissolve a small portion of soda in the water thus employed; or, at least to pass a towel wetted with a solution of soda and soap, over the surface; for such practice opens the pores, and removes the disagreeable odour arising from profuse perspiration:....a similar application will be productive of equal advantage to horses that are employed for racing, postchaises, or other purposes, where great exertions are required.

If a weak solution of soda be poured into foul bottles or casks, in which wine has been kept for a considerable time, it will completely dissolve the tartarous crust that is formed on their inner surface:....boot-tops, saddles, or bridles, may with such liquid be effectually cleansed, while the original colour of the leather is preserved.

This alkali may, likewise, be employed for sweetening kitchen-utensils, and particularly for removing grease or acids from copper vessels; because these concretions, when suffered to remain, form a strong poison, and may be productive of deleterious effects. In a similar manner, it may be used for tin and iron vessels, to prevent them from becoming rusty. Lastly, as the utensils of the dairy are apt to acquire an acid, disagreeable smell, during the summer, and particularly after a thunder-storm, though every attention be bestowed on them, such fetor may be completely removed by a small portion of soda, which will render the milk-vessels perfectly sweet; while it neutralizes and dispels the acid ferment imbibed by the wood, and which might otherwise taint the milk.

The crystals of soda are not less useful in a medicinal point of view. Thus, a solution of this salt, is an excellent *gargle* for cleansing the throat, mouth, and gums, both in a sound and in a diseased or ulcerated state; while it whitens the teeth; and dissolves all incrustations that may be formed on their surface, without injuring their enamel. And, if a small quantity of this liquid be occasionally swallowed, after washing the fauces, it is said effectually to remove a *fetid breath*. Soda is, in many instances, preferable to magnesia, for correcting acidity in the stomach; nay, it is even asserted, that it *prevents* the gout, gravel, stone, and similar disorders: lastly if the fossil alkali be mixed with cream of tartar, in the proportion of 14 parts of the former to 12 of the latter, it furnishes one of the mildest laxatives; namely, the Rochelle Salt....See also GLAUBER'S SALT.

SOFT-GRASS, the MEADOW, or *Holcus lanatus*, L. a native pe-

rennial, growing in meadows and pastures, particularly in moist, light situations: it flowers in the months of June and July. This grass, though vegetating late in the season, is very productive; but is not much relished by cattle: it makes a soft, spongy hay, that is very hurtful to horses; which, by eating it, become affected with a profuse discharge of urine, and general weakness. In case any hay, obtained from this vegetable, be accidentally given to those valuable animals an immediate change of food will prevent its farther ill effects

As the stalks of the meadow soft-grass attain a height of from two to three feet, and the root is eminently calculated for consolidating loose sandy soils, it merits to be cultivated in such situations. [See GRASS.]

SOIL, signifies the ground or mould, in which vegetables grow; and which serves as a *reservoir* for receiving and dispensing their nutriment.

Having already, under the articles ARABLE LAND; LAND; MARSH; MOOR; &c. stated the most approved methods of renovating or restoring exhausted soils, and of converting them from a state of nature; we shall now communicate a few hints, by which their *quality* may be ascertained.

To effect this purpose, BERGMAN, FORDYCE, KIRWAN, and other eminent chemists, have analyzed the constituent parts of different soils, namely; carbon, lime, clay, and siliceous sand; and, according to the respective portions of these ingredients, they conceive that the relative fertility of soils might be determined. But, as such analysis is very inaccurate and uncertain, Dr. DARWIN proposes to dry a few pounds of different soils, in the same temperature: when their moisture is evaporated, they must be weighed, and exposed to a red heat. As carbon is a principal ingredient in calcareous earths, he conjectures, that the soil which loses the greatest portion of its weight, is the most fertile; because the carbonic matter, being the principal nutriment of plants, will be dissipated in the flame.

Another mode of examining the fertility of soils is, by calculating their specific gravity, when dried at equal distances from the fire, in bladders furnished with small apertures; and, after immersing them in water, by accurately observing the difference between their respective weights, both in that fluid and in the air. But the most certain criterion, by which to judge of the value of land, is afforded by attending to the growth and colour of the vegetables spontaneously produced; and which in some measure indicate the nature of the soil beneath their roots. Thus, the Fox-glove, and Sand-wort, abound in sandy situations; the Brook-lime, and some species of Cresses, in moist ground, the Corn Saw-wort, or Way-thistle, indicates a good, as the Dock shews an inferior, soil. Many plants might be added to this list; but, we shall conclude with remarking, that if an accurate *Geographical Catalogue* of such vegetables, as grow in particular situations, were published in every country, it would be of great service, in ascertaining the degree of fertility, as well as the nature of different soils.

[SOILING, the act of cutting

grass for stall-feeding cattle; or, the practice of feeding cattle with cut grass.

The superior economy of this practice, compared with that of pasturing, was fully pointed out under the article CATTLE. When treating of clover, an expected statement of the number of hogs soiled with clover, was promised. The particulars, however, did not arrive in time for insertion in the proper place, but were since communicated, and are as follow:

Twenty-five shoats were fed for three months, with green clover, cut from less than one acre; they were then fed on Indian corn, and when killed, weighed three thousand pounds.

Soiling has been uniformly recommended throughout this work, where the practice can be followed; but where it cannot be adopted, the English mode of pasturing, as detailed by Lord DUNDONALD should be followed, viz.; to keep the fat, half fed cattle, and the lean or young stock, in different inclosures. The fat cattle should only top the grass, the half fed should succeed those, and lastly, the lean or store cattle should follow on the same pasture, and eat the herbage close down: repeating this practice as often as the fresh growth of grass will permit.

SOLIDAGO, *Cæsia*, Throat-wort, Rattle-snake-Golden-rod..... This is a beautiful species of *Solidago*, and a native of the United States: flowering in August and September. Many diverging slender stems arise from a root, and many corymbs or clusters of golden yellow compound flowers, terminate the stems, forming a panicle. The leaves are lanciolate, and sharply serrated, ending in a slender or acute point. The stems are smooth, covered with a purple bark, softened by a glacous nibule, or mist, and of a very pungent taste, somewhat similar to the *Radix Senega* (Seneka snake-root). The Indians use this plant as a cure for the bite of the rattle-snake, applied externally and internally. They also prescribe it in strong decoction, as a gargle, and diet-drink for the sore-throat. WM. BARTRAM.]

SOLOMON's-SEAL, the SWEET-SMELLING, or *Convallaria Polygonatum*, L. a native perennial, which grows in mountainous woods, and the fissures of rocks, principally in the county of York: it flowers in the months of May and June. This vegetable is eaten by sheep and goats, but is refused by horses, hogs, and cows. Its roots consist of a pulpy, tuberous, white, sweet, and mucilaginous substance: in times of scarcity, they have been converted into a wholesome bread; and are always used for that purpose, by the lower classes in Sweden and Russia: a good *starch* may likewise be extracted from them; and the expressed juice being somewhat acrid, serves as a cosmetic, or a lotion for pimples, &c. The young shoots of this, as well as of the following species may, in the spring, be eaten like asparagus.

SOLOMON's-SEAL, the COMMON, or *Convallaria multiflora*, L. is also perennial; grows in woods and thickets: and flowers in May or June. This plant is eaten by cows, goats, and sheep; it possesses the properties of the preceding, but in an inferior degree; and to which it bears so close a resemblance, that it can be distinguished only by its smaller, white flow-

ers, tipped with green; whereas, those of the former are larger, though less in number, and white, with a green line running down each segment.

SOOJU. See SOY.

SOOT, a volatile powder, of a deep black colour, and an extremely bitter taste: it arises from burning wood, coal, or other fuel; or, more strickly speaking, from the *smoke* condensed, and deposited at the sides of chimnies.

Considerable quantities of soot are employed in the manufacture of sal ammoniac; and also by dyers, for imparting a *fawn* colour to wool.....See article DYEING).....But the principal advantage derived from it, is, when used as a manure for cold, moist, and clayey meadows, and pastures; as it is of a warm ameliorating nature; affords nourishment to grass, [onions]; destroys noxious insects; protects the crop from chillingrains; and prevents the growth of MOSS.

[Soot, according to DUNDONALD, is used in many parts of Britain, with very beneficial effects, for the destruction of the wire-worm, and other insects, which prey upon the young tender leaves and roots of plants.]

The quantity varies in different counties, from fifteen to twenty-five, and even 40 bushels per acre; but it ought to be strewed on the land during the winter, and in calm weather, so that the subsequent vernal rains may wash it into the soil: for, if its distribution be delayed till the end of February, or the beginning of March, the great heat then evolved, will affect the tender shoots of the grass, and occasion a temporary check to its vegetation. Some circumspection, however, is required, that the soot be *genuine;* as the chimney-sweepers frequently mix with it finely-sifted coal-ashes; in order to increase the bulk; but this fraud may be easily detected, by the grittiness and uncommon weight of the soot.

SORB. See SERVICE-TREE.

SORE-THROAT. See QUINSY.

SORREL, the COMMON, or SORREL-DOCK, *Rumex Acetosus*, L. a native perennial, growing in meadows and pastures, where it flowers in the month of June.....This vegetable is eaten by horses, cows, goats, sheep, and swine.....It is cultivated in France and Britain, for culinary purposes; as, in the former country, its leaves are a frequent ingredient in soups, and also eaten in salads; in the latter, they are esteemed for their cooling properties, because they tend to allay thirst; to promote the urinary discharge; and when boiled in whey, they afford a palatable drink to persons labouring under inflammatory fevers.....In Ireland, the sorrel-leaves are used by the lower classes, both as a kind of sauce to fish, and also with milk: they possess, however, a very austere, acid taste, when raw, insomuch as to divest the teeth of their enamel; hence they should not be eaten by those whose stomach abounds in acidity.

The seeds of this vegetable were formerly used in medicine; but are at present, according to HEDIN employed by the Swedes, among their bread-corn, and reduced to flour; nay, the inhabitants of Carelia convert them into bread, without any addition. Its roots have an austere, bitterish taste, and are chiefly valuable to tanners; and also for the red tinge which they yield, after having been dried and boiled. On adding alum to this decoction,

painters prepare a fine red colour, but which is useless in dyeing..... BOERHAAVE obtained from the juice of the Sorrel-dock, an *essential salt*, resembling that of lemons.

[Sorrel is a very troublesome plant in meadows. Lord DUNDONALD, upon chemical principles advises, 1. The use of lime on soils in which the plant abounds..... The next growth after sorrel will be chckweed, which is a certain indication of its being in a state fit to produce grain or other crops: 2. The application of the alkaline salts, when the crop of sorrel is in the greatest abundance.]

SORREL, the SHEEP'S, or DOCK, *Rumex Acetosella*, L. is also a native perennial, which grows in sandy meadows, pastures, and gravel walks: it flowers in May and June. The stalks of this plant, which affords a wholesome food for sheep, seldom exceed twelve inches in height: it deserves, however, to be mentioned, that cows partaking of the Sheep's Dock, yield a milk tinged with blood.

SORREL, the COMMON WOOD, SOUR TREFOIL, or CUCKOW-BREAD, *Oxalis Acetocella*, L. another native perennial, which abounds in woods, shady hedges, and on heaths: it flowers in the month of April. This vegetable is eaten by goats, hogs, and sheep; but is not relished by cows, and is refused by horses. Its purple leaves yield on expression, a gratefully acid juice, which has been beneficially used in scorbutic eruptions: and, if such juice be properly clarified, evaporated, and deposited in a cool place, it will produce a considerable quantity of acid crystals, which may be employed for removing iron moulds from linen cloth; and which are sold under the name of *Essential Salt of Lemons*. An infusion of the leaves makes a palatable diet-drink in ardent fevers; and, on being boiled in milk, they form an agreeable whey. They have also been successfully applied to scrophulous ulcers, when rolled in a cabbage leaf, and digested in warm ashes, till they were reduced to a pulp. But the most easy and efficacious way of preserving these leaves, is that of converting them into a kind of conserve, with the addition of double their weight of sugar; in which form, they are an excellent substitute for lemons, and may be given with advantage in all putrid and other fevers, where antiseptics are indicated.

SOUP, a strong decoction of beef, veal, or other animal substances; and which is generally seasoned with aromatic vegetables, pepper, or similar heating spices.

Soups form a principal article at the tables of the luxurious; being generally served as a first course; though sometimes they constitute the whole dinner of those who are less opulent, under the mistaken notion, that such *liquid* is more wholesome and easy of digestion, than *solid* meat..... Such dishes ought, however, to be given with great caution to *convalescents;* as the large proportion of spices, wines, and other stimulating articles that enter into thé composition of soups, cannot fail to oppress the stomach, to irritate the system, and not unfrequently to occasion a relapse.

Portable-soup is a kind of cake formed of concentrated broth; which, being divested of all fat, while the putrescent parts of the

meat have been evaporated by boiling, is reduced to a gelatinous consistence, resembling that of glue. The composition may be preserved, in a dry place, for three or four years: it is recommended, on account of its nutritive qualities, by Sir JOHN PRINGLE, and may prove of essential service on long sea-voyages; as it requires to be eaten with a large proportion of vegetables; and thus, in some measure, prevents the attacks of that scourge of mariners, the *sea-scurvy*. When portable soup is to be cooked, it will be advisable to put half or a whole ounce of this substance into a vessel containing a pint of boiling water, which must then be placed over the fire, and continually agitated with a spoon, till it be perfectly dissolved: thus, it will form an excellent and nourishing liquid: requiring no other seasoning, but a little common salt.

SOUTHERN-WOOD, the Common. See MUGWORT, the Common.

SOUTHERN-WOOD, the Sea: See WORMWOOD, the Sea.

SOW-BREAD, or *Cyclamen Europæum*, L. an exotic plant, sometimes cultivated in the gardens of the curious. There are five species of this diminutive herb, each of which produces several varieties; all bearing beautiful fragrant white, reddish, purple, or flesh-coloured flowers.

All the species of the sow-bread may be propagated by their seeds; and the respective varieties, by dividing their roots; they require a light, dry soil; and to be planted in borders of walks: in case of severe frost, the plants should be sheltered by mats.

In a fresh state, the root of the sow-bread has an extremely acrid and burning taste; but, when dried, it is almost totally divested of such property. It is recommended as an errhine; or to be formed into cataplasms, for discussing scirrhous and scrophulous tumors. Internally taken, it operates slowly, though with great virulence, as a purgative; and is apt to inflame the fauces and intestines: but, when roasted in embers, it may be eaten with safety. In Germany, an ointment is prepared from these roots, which serves the useful purpose of relieving *costiveness*, when rubbed on the abdomen.

If, however, the root of the sow-bread should have been inadvertently swallowed, or eaten among other vegetables, it will be advisable either to take an immediate emetic; or, if some time have elapsed, to drink large portions of oily and mucilaginous liquors, such as the solutions of mutton-suet in milk, of gum-arabic, salep-powder, and similar demulcents.

SOW-THISTLE, or *Sonchus*, L. a genus of plants forming 13 species, four of which are indigenous: the principal are the following:

1. The *oleraceus*, or COMMON SOW-THISTLE, grows on cultivated ground, dunghills, and in hedges; its yellow flowers appear from June till August. The leaves of this troublesome weed are the favourite food of hares and rabbits: they are likewise dressed and eaten among other culinary herbs. The roots have occasionally been converted into bread. Sheep, goats, and swine, devour this vegetable, but it is not relished by horses.

2. The *arvensis*, CORN or TREE SOW-THISTLE, is perennial, thrives in clayey corn-fields, and on ditch-banks, where it blows in August,

It is remarkable, that the flowers of this plant follow, in a regular manner, the course of the sun..... Cows and goats eat this species, of which horses are exceedingly fond. ....BECHSTEIN remarks, that the young shoots of the Corn Sow-thistle, when cut out in the spring, and mixed with bran, afford an excellent food for cattle and swine.

3. The *palustris*, or MARSH SOW-THISTLE, grows in watery places, and on the banks of rivers, where it attains the height of from six to ten feet; flowering in July and August. While young, this plant furnishes nourishing food for cattle: hence it deserves to be cultivated in swampy meadows..... Its flowers, like those of all the thistles, are visited by bees.

SOWING, is the act of committing the seed of vegetables to the earth, in order to obtain a future crop.

This operation is performed either in the BROAD-CAST method, or by DRILLING: but, having already stated the respective advantages attending both, we refer the reader to articles BROAD-CAST, DRILL.

The most important objects in sowing are; 1. To commit the seed to the ground, at as early a period of the season as the nature of the grain, and the situation of the soil, will admit; and 2. To place every seed at a proper depth, and distance from each other. Due regard to the former circumstance will be attended with great profit, particularly in the cultivation of turnips; as an early harvest will not only thus be obtained; but the roots will also be protected from the depredations of the fly.

Some agriculturists strongly recommend to "sow dry, and set wet;" but, where the soil has been newly turned by the spade, Dr. DARWIN justly remarks, that no bad consequence can result from sowing, in general, during rainy weather: such method, however, ought to be adopted with caution on *clay-soils* (see CLAY-LAND) that are much softened by long-continued rain; because, if the seed be put into holes, and a dry season follow, the water will necessarily evaporate, and an impenetrable crust will be formed on the surface, by the *setting*, or running together of the clay. But this accident may, in some measure, be prevented, by sowing in the autumnal months, during moist weather....See also SEED.

SOY, or SOOJU, a species of liquid condiment, which is imported from India, and is used as a sauce for fish. It is prepared from the leguminous fruit of the Soja (*Dolichos soja*, L.) a native of Japan.

The pods are first boiled, till they become soft; when equal parts of them, and of *muggi* (wheat or barley that has been coarsely gronnd), are thoroughly mixed.... This preparation is then kept in a close vessel, and a warm place, for twenty-four hours, in order to ferment; after which, the mass is put into a pot, and covered with a large portion of common salt, when two *measures* and a half of water are poured over the whole. The compound is stirred, once at the least, every day, for the space of two or three months, and at the end of that period, it is filtred; the expressed liquor being preserved in wooden vessels. Fresh water is next added to the same mass; which, after stirring it occasionally for several days, is at

length strained; and the liquor, though of an inferior kind, thus rendered fit for use.

Soy possesses a strongly saline taste, but has only a slight aromatic flavour: it is chiefly used at the tables of the luxurious; and is one of those artificial stimulants of the palate, which deserves no commendation, especially for vitiated or relaxed habits.

[The Soy-bean bears the climate of Pennsylvania very well. The bean ought therefore to be cultivated.]

SPADE, a well known implement, which is principally employed in horticulture.

The *bit*, or blade of this tool, is composed wholly of iron, being about 8 or 9 inches broad, and a foot in length: the upper part is flat; and, in the centre, there is a hole or *socket*, in which is inserted a handle or shaft, being $1\frac{1}{2}$ inches in diameter, and about 3 feet long. It is employed for stirring and dressing the ground; the labourer thrusting it in, to the depth of ten or twelve inches, accordingly as the nature of the soil may require.

The English spades, in general, are well calculated for heavy garden soils; but, as there are many situations, especially those abounding in sand and gravel, which might be more easily managed with a tool of a different shape, we procured the following cut, that represents the spade employed in Tuscany, and the northern parts of Italy.

TUSCAN SPADE.

It consists of an iron spear, which is somewhat concave, being also longer, and thicker, than the implement used in Britain: instead of the workman setting his foot on the top of the blade, he places it upon a piece of wood, which crosses the shaft, three or four inches above such blade; though, we conceive, the distance need not exceed one or two inches. The manner in which this implement is used, varies in different

places. Thus, at Geneva, it is thrust into the soil, *perpendicularly;* at Persia, the earth is divided *horizontally*, or at least in a slanting direction; so that the mould is thrown to a greater distance before the labourer. The peasants of that country, indeed, have an excellent mode of using the spade, without undergoing too great fatigue: it consists simply in supporting and lifting up the handle of the implement (after it has entered the soil) on the knee; by which means they are enabled to penetrate to a greater depth, and consequently to bring up a larger quantity of earth to the surface.

SPAR, the PONDEROUS; *Barytes;* or *heavy earth*, a name given to a fossil naturally combined with the sulphuric or carbonic acids, and found in different parts of England, particularly in the counties of York, Derby, [and Lancashire.]

Its principal use in domestic economy, as a poison to rats, having been already stated, we shall only remark, that the ponderous spar may be procured in a very pure state, for *medicinal* purposes, by the process which VAUQUELIN and FOURCROY have adopted; and a translation of which has been given in Mr. NICHOLSON'S *Journal of Natural Philosophy*, &c. vol. i. 4to, p. 535....It would, however, be hazardous to mention the disorders, and doses, in which this powerful remedy is employed.

[The *Lapis Hepaticus*, a variety of this spar, has been lately found in Albemarle county, Virginia.]

SPARAGUS. See ASPARAGUS.

SPARROW, the COMMON, or DOMESTIC, *Fringilla domestica*, L. a well-known bird, whieh abounds in Britain, particularly in the vicinity of villages and towns.

Sparrows construct their nest beneath the eaves, and in the holes of walls, roofs, especially in those of willow-trees, where they lay five or six eggs of a pale reddish colour, spotted with brown. These birds are very crafty, and voracious; committing great depredations in corn-fields, where they partake of every species of grain: on the other hand, they are also useful, by devouring numerous worms, insects, and particularly the green caterpillar. But, in situations where sparrows are very troublesome from their numbers, they may be easily taken, by constructing a trap of unpeeled oziers, about two feet in diameter, nine inches deep; and resembling in its form a *fish-pot*. The tunnel is somewhat *dished*, having an inverted cone in the centre, which extends to within the space of one inch from the bottom of such basket; the opening, formed by the points of the twigs, being an inch in diameter. This trap must be baited with wheat, or other grain; and, when the birds have entered through the internal aperture of the cone, they cannot escape.

For the protection of fields, gardens, and especially of wall-fruit, from these predatory birds, we can suggest the following expedient.... Slips or pieces of spangle-metal (plate-foil) six inches long, and three broad, should be suspended on long poles by means of strings, about half a yard in length, and fastened to the top: by the agitation of the wind, they will occasion a continual crackling noise, which is so terrifying to sparrows, that they will not venture to ap-

proach the vicinity of such scarecrows: in fields, however, the latter ought to be placed at a distance of about 12 or 15 yards square, from each other.

SPARROW-HAWK: See HAWK, the Common.

SPASM, an irregular and involuntary contraction of the muscles, generally accompanied with painful sensations: this complaint has, of late years, made such rapid and formidable progress, especially among the female sex, as to demand serious attention.

Spasms are either *general*, where many or most of the muscles are attacked (as in *tetanus*, *catalepsis*, *&c.*); as *partial*, when the contraction is confined to single muscles, for instance, of the jaw, of the throat, and other parts, which have been stated under their respective heads.

Among the chief, pre-disposing *causes*, is an irritable, weak, nervous system; while the occasional ones are, passions of the mind; injury produced by external violence, by poisons, of every description; worms; suppressed perspiration; cosmetics and lotions; repelled cutaneous eruptions; and whatever, may induce an increased action of the nerves and muscles. Nothing, indeed, has so evidently contributed to the frequency of this affection, as the defective *modern education*, particularly of females; and according to which, *children* are considered as adults; they are allowed to read seductive books; to dress in an improper, or at least, unbecoming manner; and even infants are suffered to partake of tea, wine, and spirituous liquors, under the pretext of using them as medicines.

The danger attending spasmodic paroxysms, depends on the greater or less violence of the attack:....if they proceed from too profuse evacuations, there is great danger to be apprehended; as the patient is already exhausted. Where spasms are occasioned by the taking of mineral or animal poisons; or, if the patient labour under an acute fever, the event is generally fatal.

Cure:....The first step will be to remove the irritating cause; and next, to restore tone to the organs: thus, if the spasm originate from an injury by a sharp instrument, such as a needle, especially if a piece of it remain in the wound, it ought to be immediately extracted. During the fit, clysters made of a decoction of chamomile flowers, with a dram of ipecacuhana, asafœdita, or other antispasmodics, to be repeated every two or three hours, will afford the greatest relief: beside these, recourse may be had to warm-baths, frictions, and the application of volatile liniments. If the teeth are not too closely shut, half a tea-spoonful of either the tinctures of castor, asafœdita, or valerian, diluted with a table-spoonful of water, may be introduced through the mouth..... Next, it will be necessary to regulate the treatment according to the cause of the malady. If it arise from a suppression of cutaneous disorders, blistering plasters, and other artificial issues, will be the most proper means of restoring the discharge of humours: if it proceed from two tight shoes, or other garments, the part should be rubbed with warm oil, till it become soft; and then a tight bandage be applied round it: the leg should afterwards be bathed in cold wa-

ter impregnated with scales of iron, or rubbed with volatile liniment:.....if induced by WORMS (which see) suitable remedies must be administered. But, where it originates from mental causes, the cure itself ought to consist of moral remedies; as physical means would, in general, be found inadequate.

With a view to re-invigorate the system, and to prevent future attacks, decoctions of quassia, wormwood, chamomile, Peruvian bark, valerian, and other antispasmodics, may be taken with advantage, especially when conjoined with cold bathing; and, in cases of worms, with the liberal use of red-port; a glass of which may, for that purpose, be drunk every morning, on an empty stomach.

SPATLING-POPPY, WHITE BOTTLE, or BLADDER CAMPION, *Cucubalus Behen*, L. a native perennial, which grows in cornfields, dry meadows, and pastures: it flowers in July and August..... The leaves of this vegetable, when boiled, possess the flavour of peas; and are by the Gothlanders advantageously applied to erysipelatous eruptions. The flowers are eagerly visited by bees, as well as by the most beautiful butterflies, in twilight.

SPAVIN: See BONE-SPAVIN.

SPAWN: See ROE.

SPEAR-MINT: See MINT.

SPEARWORT, the GREAT, or *Ranunculus Lingua*, L. an indigenous perennial, growing in wet pastures, and at the sides of lakes: it flowers in the months of June and July. The stem of this poisonous plant is very thick, and attains the height of two feet; the leaves have no stalks; and the large bright-yellow, glossy flowers, appear on the extremities of the shoots. The whole is extremely acrid, and if any part of this herb be eaten by cattle in a fresh state, it is apt to produce fatal distempers.

SPEARWORT, the LESSER, or *Ranuncules Flammula*, L. is also a native perennial, growing on bogs, swampy meadows, and the sides of rivulets; flowering from June to September. It is eaten by horses, in which it occasions many concealed disorders, but is refused by cows, goats, sheep, and hogs.... This plant is very acrid; if externally applied, it inflames and blisters the skin:....its distilled water is a most powerful *emetic*, operating as soon as it is swallowed; and Dr. WITHERING states, from his own experience, that, in cases of poison having been accidentally swallowed, or in which it becomes necessary to produce an immediate vomiting, such distilled water is preferable to any other preparation; as it does not excite the painful contractions, which are sometimes consequent on the use of white vitriol, and thus defeat the object for which the latter is administered.

SPECTACLES, a well known and useful optical contrivance, in order to aid the eyes of the aged, or young invalids of defective vision, by means of two appropriate lenses. Those used by *short-sighted* persons, are generally concave; as the spectacles employed by the *far-sighted*, or convex.

The choice of spectacles being an object of great importance, to all who are anxious to preserve their eyes, we shall select a few rules from Mr. ADAM's valuable *Essay on Vision*; and the Editor's *Lectures on Diet and Regimen*. By

a careful attention to such directions, the failure of sight may be retarded, and the eyes greatly relieved.

Those, who stand in need of spectacles, ought at first always to chuse such as represent objects, without enlarging or diminishing them; and which, on being placed near the eye, exhibit printed characters clearly and distinctly, without straining that organ. It will, therefore, in every instance, be advisable to consult the artist of whom the glasses are purchased: for, though every person must eventually determine what lenses afford him the most accurate vision, the former will thus be enabled to accomodate them to the eye of the latter, with greater certainty and advantaqe. Besides, the fatigue of trying a variety of glasses, will thus be obviated; and the purchaser will procure a pair, best adapted to the structure of his eyes. *Short-sighted* persons ought always to make a very gradual allowance in changing their spectacles, so as to select others which magnify a little more than the preceding pair, though somewhat less distinctly, without obscuring the object. Thus, their sight will be imperceptibly improved; and, after making use of less concave lenses, the defect of vision may, in process of time, be entirely remedied. These transitions, however, ought not to be *sudden;* lest the resources of art should be too early exhausted. And, as it would be difficult to meet either with a pair of glasses in the shops, that exactly fit both eyes, or with a person whose organs of sight are both of a size and construction perfectly equal, it rationally follows, that such important choice should be separately made, with respect to each of these useful organs.

Spectacles are generally transparent and colourless; though sometimes *green lenses* are preferred by those, whose eyes are unable to support a vivid light. Such colour is believed to be the most soothing to the human eye; though it tends, at first, in some degree to darken the object..... Hence, this shade will prove beneficial only to persons who possess strong, but irritable eyes; yet even such individuals should not indulge in it, if light-coloured objects continue to assume a reddish tinge, after having tried the experiment for a few days. In all cases, however, spectacles ought to be employed only in writing, reading or similar occupations that render this artificial aid necessary; and during which, the eye is retained at an uniform distance.

In December, 1793, a patent was granted to Mr. John Richardson; for his invention of a machine that may be applied to spectacles or glasses, and pebbles of every kind. As, however, no distinct idea can be formed of his contrivance, without a proper delineation, we refer the reader to the 10th volume of the *Repertory of Arts*, &c. where it is described, and illustrated with an engraved figure. Hence, we shall only observe, that the chief object of the patentee's invention, appears to be that of preventing the necessity of employing two pair of spectacles, where these are occasionally required; as two *distinct* sights may thus be obtained, for any purpose, according to the desire of the wearer.

SPEEDWELL, or *Veronica*, L. a genus of plants comprehending

54 species, 17 of which are indigenous: the principal of these are the following:

1. The *Beccabunga*: See BROOKLIME.

2. The *Chamædrys*: See GERMANDER, the Wild.

3. The *officinalis*, COMMON SPEEDWELL, MALE SPEEDWELL, or FLUELLIN, is perennial, grows on heaths, and in barren grounds; flowers from May till August..... The leaves of this vegetable are slightly bitter and astringent: formerly, an infusion of them was highly prized, as a domestic remedy in coughs and asthmatic complaints. In a decoction with iron-filings, these leaves yield a black dye for leather. The plant is eaten by cows, sheep, goats and horses: refused by hogs.

4. The *scuttelata* or NARROW-LEAVED SPEEDWELL, thrives on poor swampy soils, and flowers from June to August. It affords grateful food to geese and ducks.

5. The *Anagallis*, or NARROW-LEAVED PIMPERNELL - SPEEDWELL, grows in slow streams and shallow ponds, where it flowers in July and August. This species may be eaten both as salad, and among other culinary vegetables.

SPELTER: See ZINC.

[SPENCER, (MARINE.) A very useful contrivance by K. SPENCER, Esq. of London, for the preservation of lives in cases of shipwreck, or other accidents, in rivers or at sea.

It consists of A, a girdle, of a diameter to fit the body, six inches broad, composed of about 800 corks, strung upon a strong twine, well lashed together with lay-cord, covered with canvas, and painted in oil, so as to make it water-proof.

B, B, are tapes or cords, about two feet long, in the middle of which a few corks are strung, covered with canvas, and painted as above.

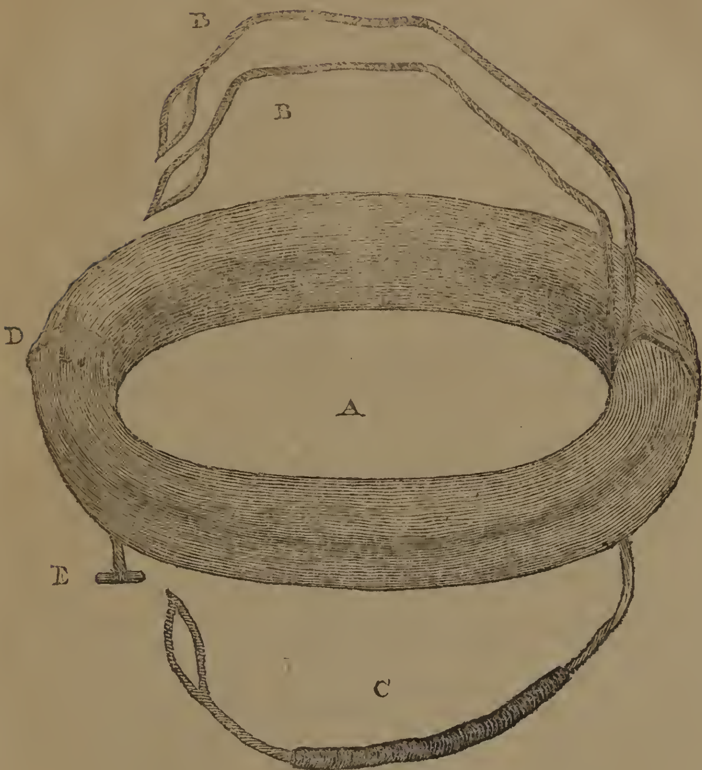
D, is a pin of hard wood, three inches long, and half an inch in diameter, fastened to the front of the girdle by a tape or cord about two inches long.

E. the same.

When the spencer is to be used, slide it from the feet close up under the arms; bring the tapes or cords B, B, one over each shoulder, and fasten them by the loops to the pin D; bring the tape or cord C, between the legs, and fasten it to the pin E.

A person thus equipped, though unacquainted with swimming, may safely trust himself to the waves; for he will float head and shoulders above water in any storm, and by paddling with his hands, may easily gain the shore, or keep afloat until taken up by boats.]

MARINE SPENCER.



SPERAGE: See ASPARAGUS.

SPERMACETI, a flaky, white-ish, somewhat unctuous substance, and nearly destitute of smell; being obtained from the head of the *Physeter macro-cephalus*, L. a species of whale.

As the manner of preparing this expensive article is studiously concealed, we shall only observe, that *good spermaceti* is perfectly white, glossy, and semi-transparent; rather soft and oily to the touch, though friable and dry; its taste resembles that of fresh butter, and its smell is faint, like that of tallow. It is said to be often adulterated with wax; but such fraud may be speedily detected by the peculiar smell of the latter substance, and by the dullness of the colour. A preparation of the oil obtained from the tail of the whale, is likewise vended for genuine sper-

maceti ; but, as it assumes a yellow shade on exposure to the air, such imposition may be easily discovered. It will, however, be necessary, in all cases, to preserve spermaceti in vessels, closely secluded from the atmosphere : as this drug is apt to become rancid, and to acquire a disagreeable colour ; thought it may be restored to its original purity, by steeping it in a ley, composed of quick-lime and alkaline salts.

The quantity imported, being not only inadequate to the demand, but also grossly adulterated, Mr. SMITH GIBBES (now Dr. GIBBES of Bath) proposed, in the 2nd Part of the *Philosophical Transactions of the Royal Society*, for 1794, to convert animal muscles into a fatty substance, resembling spermaceti : His chemical process consists in enclosing the carcass of a horse, cow, &c. in a box perforated with holes and immersing it in a clear stream or river, for the space of a month, or longer; when it will be converted into a mass of unctuous matter. A certain portion of nitrous acid (aqua-fortis) is next poured on this *cheesy* substance, in order to discharge the offensive smell, and separate the fat in a pure, though somewhat yellowish state. Such colour may, however, be removed, and the whole tolerably bleached, by submitting it to the action of the oxygenated muriatic acid. Dr. GIBBES farther observes, that this remarkable conversion may be effected in the course of *three* days, by pouring nitrous acid on a piece of lean meat. Nay, the illustrious Lord BACON mentions the following curious circumstance in his work, entitled "*Sylva Sylvarum;*" namely, that the flesh of animals may be changed into a fatty substance, by cutting it in pieces, which are to be put in a glass covered with parchment, and thus allowed to stand six or seven hours in boiling water. "It may be an experiment of profit (says BACON) for making grease or fat, for many purposes ; but then it must be made of such flesh as is *not edible*, as horses, dogs, bears, foxes, badgers, &c." It appears, likewise, from Dr. GIBBES's Memoir, that the putrefactive process is not necessary for effecting this change ; as it would waste a considerable portion of flesh, that might serve to form a larger mass of waxy substance.

Great quantities of spermaceti are annually consumed in the manufacture of candles and tapers, which are preferable to those made of wax ; as the former burn not only brighter, and are of a finer colour, but when genuine, do not stain, or grease the finest silks, linens, or cottons....This drug is also used as a cosmetic, for softening and cleansing the skin. In medicine, it is chiefly recommended in the form of an emulsion, with distilled waters and the yolk of eggs, for relieving various affections of the intestines ; coughs arising from defluxions of acrid humours, &c....Spermaceti is also dissolved in oils, and beneficially applied to bruises, sprains, and similar injuries ; as it contributes to mitigate pain.

SPICE, a general denomination of aromatic drugs, possessing hot and pungent properties. Such are ALL-SPICE, NUTMEG, PEPPER, the seeds of the CARAWAY and CARDAMOM, GINGER, MACE, SALT, &c. of which we have given an account, in the progress of this work. Hence, it will be useful

here, to subjoin a few remarks on the general properties of spice, and conclude with enumerating several *substitutes* for the imported drugs, that deserve to be more generally cultivated.

The chief culinary use of spices, is that of serving as an ingredient in sauces, or for seasoning different articles of food, either with a view to render them more palatable, or to obviate some hurtful effects, such as flatulency, acidity, &c..... Nevertheless, condiments are mostly of a hot and stimulant nature, tending to irritate the nerves, and ultimately to relax the stomach: hence they ought to be employed with *moderation*, and only with provisions that cannot be easily digested without them; for the daily use of pungent drugs at the table, necessarily excites thirst; and many persons thus contract the ruinous habit of committing excess in fermented, vinous, or spirituous liquors.

Among the various plants, which merit the attention of gardeners, with a view to serve as *substitutes for Indian spice*, we shall mention the following:

I. Monarda, or Indian Horehound (*Monarda Zeylonica*, L.) a native of Ceylon, but which thrives in the open air of our climate. There are two species of this plant....the *fistulosa*, and *didyma*: the leaves and blossoms of both possess a very delicate fragrance; so that they may be used for making tea, and for imparting a fine flavour to *made* wines, or brandy. But the most useful part of this vegetable, is its aromatic *seeds*, which M. Zizman, a German clergyman, has lately cultivated to a great extent, and found them equally serviceable in domestic economy, as the most costly spices obtained from the Indies.

Beside the utility of the *Monarda*, or Oswego-tea, as a substitute for spice, its leaves may be advantageously used instead of those of the Tea-tree: the flowers also, when infused in brandy, impart to it an agreeable flavour, resembling that of peaches.

II. Basil (*Ocymum*), a native of warm climates, consisting of eight species: these are propagated by seeds, and will also thrive in the open air of this country: if placed in a green-house, even their seeds attain to maturity. The following three species are the principal: 1. The common Basil (*O. vulgare*); 2. The Citron-flavoured Basil (*O. citri odore*); and, 3. The Pink-scented Basil (*O. caryophyllatum maximum*). The leaves of all these plants should be employed in a *dried* state; as they are too penetrating while fresh: those of the last kind, in particular, may serve as excellent substitutes for nutmeg and mace, in tarts, pies, mulled wine, and other preparations.

III. Garden-Thyme (*Thymus vulgaris*) is a spicy herb, the fragrant blossoms of which should be collected, dried, and used like those of the preceding.

IV. Savory: which see.

V. Marjoram: See p. 42.

VI. Cicely: See vol. ii. p. 132.

VII. Sage, the Balsamine: See p. 9. of this volume.

VIII. Tarragon: which see.

IX. Spignel: See next page.

Beside these, we shall remind the reader of a few other spicy plants commonly met with, in British gardens; for instance, fennel, coriander, mustard, caraway, rue, mint, penny-royal, balm, mugwort, &c.....When compared with

some of the *foreign* drugs, they excel many of the latter, both in flavour and virtues, so as to render their importation superfluous: nay, the untutored Indians may justly smile at the folly of Europeans who, instead of encouraging the culture of native plants, or such as readily grow in their climates, send the money earned by the industry and hard labour of their husbandmen, over the tempestuous ocean.....frequently at the loss of many valuable lives.

SPIDER, or *Aranea*, L. a genus of insects comprehending 50 species, of which the following are the principal, namely:

1. The *Common House-Spider*, is generally of a black-colour; has eight legs, each of which is furnished with three joints, and terminates in three crooked claws. This insect has eight eyes; and, in the fore-part of the head, there is a pair of pincers, or claws, with which it kills flies, &c. for food. It is also provided with five warts or prominences, at the extremity of the abdomen, through which its viscous filaments are evolved.

Spiders abound in almost every house, spinning their webs in corners of the ceiling, where they are not disturbed. The females are very prolific, laying from 4, to 500 extremely minute eggs; and, tho' both sexes mutually devour each other with great ferocity, except in the breeding season, their numbers are not perceptibly diminished.

These insects are remarkable for their industry: their appearance, however, excites a degree of disgust in many weak-minded persons, who are apt to persecute and destroy them, without mercy. But, independently of their utility in reducing the number of flies that appear during the summer, they afford a very accurate *natural barometer;* because the celerity, or indolence, with which they work, indicate the approaching variations of the atmosphere, Thus, if the weather be about to change, and become wet, or windy, the sagacious creatures make the terminating filaments that support their web, uncommonly short. But, if such threads be extended to an unusual length, the weather will remain serene for 10 or 12 days, or for a longer period, according to the proportionate extension of the former. On the contrary, when the spiders are totally inactive, rain will shortly follow; but, if they continue to spin during a shower, it is a certain indication, that the rain will speedily cease, and be succeeded by calm, fair weather.

2. The *Calycina*, or Garden Spider, varies from the preceding species only in its having a round, pale-yellow belly, and two hollow points. It inhabits the *calyces*, or cups of flowers, after the floral leaves are decayed; where it preys upon bees, and other flies, that resort thither for honey.....This insect yields a kind of silk, which is by some deemed little inferior to that produced by the worm; but, as the filaments of the former are, in the opinion of REAUMUR, not equal to those of the latter, either in strength or lusture, they are never employed in manufactures.

SPIDER, the RED, or SCARLET TREE-MITE, *Acarus baccarum*, L. a small insect having a roundish body, and a smooth, glossy skin. The colour is a deep-red, and the whole animal appears to be distended, and ready to burst. It frequents currant and other fruit-trees; but it is particularly destruc-

tive in hot-houses. Hence gardeners have resorted to different methods of extirpating them, and especially that of sprinkling them with a strong ley of wood-ashes; but, as the saline particles of this liquor are very hurtful to tender plants, it will be more advisable to remove such vermine, by means of a common painter's brush ;...their depredations may likewise be prevented, by keeping the hot-house perfectly clean.

Independent of the method of exterminating these vermin, already suggested, the following is recommended by Mr. FORSYTH. It merely consists in irrigating the infested plants with lime-water, in the afternoon, particularly on the lower side of the leaves. In hot-houses, however, he advises a *barrow-engine* to be filled with soft water, and all the plants to be sprinkled, by directing the stream against the top-lights, and shelves, till the water be an inch deep in the paths. But, where the building will not admit of the entrance of a barrow-engine, the front or top-lights must be slidden down, and the water poured in from above. When this affusion is commenced, if in the inside, every light ought to be shut; but if the fluid be introduced from without, one light only should be opened at a time; and which must be shut, as soon as the part opposite to it is sufficiently watered. The other lights are then to be successively removed; and, when the irrigation is completed, the house should be carefully closed till the next morning. In consequence of this operation, vapours will arise in every part of the building; cover all the plants; and effectually destroy the red spider, together with all other vermin. Mr. F. farther observes, that the watering must be repeated every day, during hot weather; and that it will, in general, shorten the labour, which would otherwise be required in irrigating plants. Such vegetables, however, as require copious humidity, ought to be watered previously to sprinkling the house: thus, the plants will imbibe all the moisture, and the paths will become perfectly dry, during the night. See also INSECTS, PINE-APPLE.

[The bites of spiders are sometimes very painful. A remedy for the complaint was described under the article PLANTAIN.]

SPIDERWORT, the MARSH, MARCH-TOFIELDIA, or SCOTCH ASPHODEL, *Anthericum calyculatum*, L. (*Tofieldia palustris* of Drs. SMITH and WITHERING), a native perennial, which grows in bogs, on mountains in Scotland, and flowers from July to September......This plant, though useless in domestic economy, deserves some notice; because it may serve as a guide to dig for *peat*, in situations destitute of sea-coal.

SPIGNEL, or SPICKNEL, *Æthusa Meum*, L. a native perennial, growing in mountainous pastures, principally in the northern counties, where it flowers in the month of May.....The roots and seeds of this vegetable have a pleasant aromatic smell, and a hot, bitterish taste. They have occasionally been used as *carminatives*; and also been administered in tertian agues. At present, they are seldom employed, either in domestic economy, or in medicine; though Dr. WITHERING observes, that they will often answer as substitutes for pepper, or other pungent aromatics.

SPIKE-OIL, the name of an essential oil distilled from the LAVENDER-SPIKE, considerable quantities of which, are used by varnish makers, painters in enamel, &c....See also LAVENDER.

SPINACH, or SPINAGE, the COMMON, *Spinacia oleracea*, L. an exotic plant, cultivated in Britain, for culinary purposes. If intended for *winter-use*, it is propagated by the seed, in beds of light, rich earth, towards the end of July, and during moist weather. When the young plants appear, they must be carefully weeded, and thinned to the distance of five inches: in October, they will be fit for use; when the longer leaves only should be gathered to; those in the centre being suffered to grow to a larger size; so that a bed, thus managed, will afford a supply of this vegetable during the winter, till the spinach sown for *spring-use*, is fit for the table; which generally succeeds in April.

BECHSTEIN remarks, that the agriculturists of Germany strongly recommend the culture of the common spinach, on land which has been once ploughed after a crop of barley; where it will produce early and excellent spring-food, either for sheep, hogs, or cattle: it may, farther, be mown two or three times during the summer, and afterwards be fed off by sheep, or suffered to *run to seed*.

This vegetable is greatly esteemed at the table; but, when dressed with melted butter, it passes speedily through the bowels, without being duly digested; and consequently affords little nutriment. It is particularly improper for persons of weak and relaxed habits; as it debilitates the alimentary canal; excites looseness; and not unfrequently occasions the heart-burn, or acidity in the stomach.

SPINAGE, the Wild. See perennial GOOSE-FOOT.

SPINDLE-TREE, the COMMON, PRICK-TIMBER, GATTERIDGE-TREE, or LOUSE-BERRY, *Evonymus Europæus*, L. an indigenous shrub, which, in favourable situations, attains the height of 20 feet: it grows in woods and hedges, and is very common in Devonshire; where it flowers in the months of May and June.

The berries of this elegant shrub operate violently, both as an emetic and carthartic:...if eaten by sheep, they infallibly destroy them. Reduced to powder, and sprinkled on the skin of men or animals, these berries are said to exterminate vermin of every description.....When the Spindle-tree is in blossom, its wood is remarkably tough, and broken with difficulty; in such state, it is employed by watch-makers, for cleaning time-pieces; by musical instrument makers, turners, and for veneering....We learn, however, from BOHMER, that some artisans, working in this wood, have asserted, that they became subject to nausea and vomiting.......The shoots of the Spindle-tree, in the spring, are so grateful to cows, that they generally damage the banks of fences, in order to obtain their favourite food....Sheep and goats also eat the leaves; but they are disliked by horses.

In dyeing, the bark of this shrub imparted, according to SIEFERT, a pleasing sea-green colour to woollen cloth, by adding to the decoction of such rind, one-sixth part of a solution of verdigrease, saturated with crystals of tartar. The tint was so permenent, that no change took place in its shade, after having

been exposed for a fortnight to the rays of the sun...The seed capsules of the Gatteridge-tree, when fermented in alum-water, produce a durable pale-yellow dye.

[Three species of *Evonymus*, are natives of Pennsylvania, and being highly ornamental, deserve a place in the garden or grounds of every country residence. These species are *E. Caroliniensis; E. latifolius*, and *E. sempervirens*, all of which grow naturally in moist shady places.]

Spine, Luxations of. See Distortion, and Ribs.

SPINNING, is the art of twisting flax, hemp, silk, cotton, wool, or similar matters, so as to reduce them into yarn or thread.

Spinning is generally performed, either by means of a wheel, or sometimes with a distaff and spindle: but, as the wheels commonly employed for this purpose, are aukward and inconvenient, Mr. Antis, of Fulneck, near Leeds, in 1793, submitted to the inspection of the *Society for the Encouragement of Arts*, &c. a model of an improved spinning-wheel; for which they conferred on him a bounty of 20 guineas.

The usual method of stopping the wheel, with a view to remove the yarn from one staple on the flyer to another, necessarily occasions great loss of time; but, in Mr. A.'s contrivance, the bobbin is so arranged, as to pass backward and forward, in order to prevent any interruption; and at the same time to obviate both the breaking of the thread, and losing the end: hence, the spinner is enabled to perform more work, in a given time, than is practicable by any other spinning-wheel. Such object is effected, by extending the axis of the great wheel through the pillar next the person spinning; and forming it into a pinion of one leaf, which catches into a wheel, seven inches in diameter, having on its periphery 97 teeth; so that 97 revolutions of the great wheel require only one of the smaller wheel. On the latter, a wire-ring is fixed; which, being supported on six legs, stands obliquely to the wheel itself; touching it at one part, and projecting nearly three quarters of an inch at the opposite edge. Near the side of this wheel, is an upright lever, about 15 inches in length, moving on a centre, three inches from its lower extremity, and connected at the top with a sliding bar. From such bar rises an upright piece of brass, which works in the notch of a pully, and drives the bobbin to and fro, during the revolution of the wheel.

In order to regulate and assist the alternate motion, a weight, is suspended by a line from the sliding-bar; and, passing over a pulley, it rises or falls, as the bobbin advances or recedes; tending constantly to keep the pin in contact with the wire. In consequence of this construction, the flyer requires only one staple; which, being fixed near its extremity, the thread entering through, is regularly laid on the bobbin, by the rotary motion of the latter.

Since Mr. Antis presented the model of the machine here described, he has made several alterations, which greatly contribute to its perfection; and for which the Society, in 1795, rewarded him with the additional sum of 15 guineas. As we conceive, that an account of these improvements will be inte-

resting to every industrious housewife, we shall concisely state them, together with Mr. A.'s remarks.

1. At every revolution of the wheel, in his former machine, the pinion with one leaf occasioned a very disagreeable catch, while the bobbin moved only by *jerks*, and did not receive the thread in an uniform manner. With a view to remedy this inconvenience, Mr. ANTIS has adopted the motion of an endless screw, working a toothed wheel, on which is fixed a heart-shaped piece of brass.

2. As the spinner should always be enabled to hold the thread at pleasure, and not *let it in*, till it be sufficiently twisted, Mr. A. observed that, the bobbin moving on a square, its motion was so impeded, that when it began to be filled with thread, it became immoveable, notwithstanding the action of the weight; and, when the thread was afterwards left at liberty, it *started* at once half an inch and upwards.

3. As, in the wheels of the common construction, and also in those of Mr. ANTIS's first improvement, the friction of the bobbin could be augmented only by stretching the common cord, which was not practicable, without making the wheel revolve with increasing difficulty, particularly when the bobbin was nearly filled; he was induced to make use of a single cord, the sole design of which is to turn the flyer; and, in case it should become slack, it may be contracted or shortened, without requiring any screw.

Farther, to regulate the friction of the bobbin, Mr. A. has fastened a neck of steel or brass to one end, which is kept steady by a vice, or by pincers, fixed to the sliding-bar. Such vice is directed to be made either of two elastic springs, furnished with wooden tops; or wholly of wood *bushed* with leather, and provided with a spring, under the shoulder of the screw, to answer the same purpose. By tightening this screw to a greater or less degree, the friction may be most accurately regulated, without impeding the velocity of the whole; as no additional machinery obstructs the general motion. Mr. ANTIS, therefore, concludes that a wheel, on this improved plan, will be found to run more freely than those with a double cord; a circumstance of the greatest importance, to a person whose daily livelihood is obtained by spinning: nay, even a lady who sometimes spins for her diversion, was much pleased with his *first* invention, and thought it might save a person at least two hours in a day. He observes, that his contrivance may be added to old spinning wheels of every construction; and that it would not considerably increase the price of a new machine, made according to his plan.

SPIRITS, a general name given to ardent liquors, obtained by distillation.

Surprizing as it may appear to many of our readers, who are unacquainted with *vegetable* nature, we may positively affirm, that a sufficient quantity of *wild* neglected fruit annually grows in this country, to produce an adequate supply of spirituous liquor, without using any *bread-corn*, for such wasteful purpose. Of this description, in particular, are the berries of the DOG-ROSE, QUICKEN-TREE, and numerous other native shrubs, that have been men-

tioned in the progress of the present work; and a recapitulation of which, will appear at the conclusion, in the *General Index of Reference*.

SPIRIT OF WINE, an ardent, colourless liquor, destitute of any peculiar flavour: it may be obtained by distilling the *farinaceous* or *saccharine* roots, as well as the pulpy fruit of vegetables, in general, by means of a common still, but more effectually in what is termed a water-bath *(balneum maris)*; after which, the spirituous fluid is purified by repeated rectification; and, when divested of nearly all its aqueous particles, it is called ALKOHOL.

This expensive liquor is chiefly employed for dissolving gum-resins in the preparation of varnishes: for separating resins from the vegetable matters containing them; and also for making essences, tinctures, elixirs, and various other compounds, for medicinal use. It may likewise, be applied with advantage to different parts of the body, especially in sprains and bruises; as it strengthens the vessels; but, if inadvertently swallowed in a pure state, and in a large quantity, it corrugates the membranous parts of the stomach; being attended with a temporary suspension of their functions, and sometimes even inducing apoplexy or palsy, which generally ends in death. Hence, spirit of wine ought to be preserved with the greatest caution, so that children or ignorant persons may not have an opportunity of *tasting* so deleterious a liquor.

SPLEEN, is a spongy viscus, situated in the left side near the lower part of the stomach, under the ribs. This organ is supposed to be designed by Nature to prepare the blood for the secretion of bile in the liver. Its purpose, though inacurately known, must be important to the animal economy; as indigestion, and a variety of other complaints, have resulted from splenetic affections..... It deserves to be remarked, that the term *Spleen* is frequently used to denote a disorder, which is more strictly, by physicians, called *hypochondriasis*.

The principal diseases of the spleen are inflammations, obstructions, and indurations. In the first case, the causes and symptoms are similar to those described under *inflammatory fever:* at the same time, a tumor and pain are felt in the left side; the latter increasing on pressure....Chronic inflammation of the spleen, however, may also be consequent on diseases of the liver, such as the jaundice, piles, &c. The treatment will, therefore, chiefly consist in the application of the same remedies as are mentioned in the page above quoted; but, where the patient is of a plethoric habit, or was previously subject to the piles, leeches applied to the anus have proved of great service..... Calomel and antimony, taken internally, under judicious management, have likewise been attended with good effects.

If the spleen be obstructed or indurated, a pain and tumor will also be felt on the left side, bearing downward like a weight; the patient finding it difficult to lie down on that side: the bowels are generally costive: and respiration is impeded....The *cure* of this affection requires the same

method as is recommended for obstructions and scirrhosity of the liver....See SCIRRHUS.

SPLEEN-WORT, or HART'S TONGUE, *Asplenium scolopendrium*, L. a native perennial, growing in the fissures of moist shady rocks, old walls, and at the mouths of wells: where it flowers in the months of August and September. .....The medicinal powers of this vegetable are highly praised for curing the bites of venomous serpents; in hypochondriasis; palpitation of the heart, &c.; of which, however, we have had no experience.

SPLENTS, in farriery, denote hard excrescences of various shape and size, appearing on the shank-bone of a horse....Unless they arise from blows, or other accidents, few horses *put out* splents, after they are seven or eight years old; and, when occuring in young horses, they frequently wear off, and spontaneously vanish.

Splents, on their first appearance, should be well bathed with vinegar, or old verjuice; which often checks their farther progress: in some animals, purgatives and diet-drinks will contribute to remove watery swellings about the limbs, which frequently induce such malady.

According to Mr. TAPLIN, a radical cure may, in general, be effected by rubbing the excrescences, for a considerable time, twice every day, with the utmost force of the operator's hand; well moistening the part after each friction, with a little of the following liniment:....Take of camphorated spirit of wine, and spirit of turpentine, each 4 oz.; to be uniformly incorporated. Or, oil of origanum, and spirit of turpentine, each half an ounce: and camphorated spirit of wine 2 oz. to be duly mixed....A pledget of tow, wetted with either of these preparations, ought to be fastened round the splent, with a proper bandage.

Should those powerful discutients fail of success, recourse must be had to the strongest mercurial ointment: a portion of the size of a hazel-nut, ought to be chafed into the part affected, every night and morning, till two oz. of it have been used; applying the roller or bondage, as before directed.

But, if these various remedies be insufficient to procure relief, the best and most speedy method, will be that of extirpating the excrescence by the knife....This operation may be performed by a longitudinal incision through the integuments (without bruising, hammering, &c.), then dissecting, and extracting the substance: thus, the cure may be completed by taking up a couple of stitches, and treating the part like a superficial wound.

SPONGE, or *Spongia*, L. a genus of animal plants, comprehending 50 species, the principal of which is the *officinalis*, or Common Sponge. It is imported from the Levant; being a soft, porous, light, substance, which easily imbibes water.

Sponge is of extensive utility in domestic economy, medicine, and surgery. If it be cut in small pieces, fried or dipped in honey, and given to vermin, it distends their intestines, and effectually destroys them [see RATS]. As it strongly adheres to the orifices of

wounded vessels, it is advantageously employed as a styptic; often preventing the effusion of blood more effectually than the puff-ball or AGARIC....When burnt and pulverized, it has been successfully administered internally, in scrophulous complaints, and cutaneous diseases, in doses of one scruple and upwards: it is also considered as a *specific*, on account of its efficacy in removing the glandular swelling of the neck, known under the name of *bronchocele*..... See WEN.

SPOON-WORT. See SCURVY-GRASS, the English.

SPOTS, are marks or stains accidentally occurring on linen, woollen, cotton, silk, or other stuffs.... Under the head of CLOTH, we have already communicated several methods of discharging spots from *woollen-cloth*: hence we shall, in this place, add another remedy which may be easily prepared; though we have had no experience of its effects:......Dissolve two ounces of pure pearl-ash in a quart of spring water, and add to this solution a lemon cut in small slices. Let the whole be properly mixed, and kept in a warm place for 24 hours; when the liquor should be strained, and the clear fluid decanted for use. It is asserted, that this compound, when poured on the stained part, instantaneously removes all spots, whether they arise from grease, pitch, or oil; and, as soon as they disappear, the cloth must be washed in pure water....See also BALLS (PORTABLE.)

Ink-spots on *woollen*-cloth may be discharged by rubbing them with a composition, made of the white of a new-laid egg, and a few drops of oil of vitriol, properly incorporated; afterwards washing the stain with pure water, and lastly, smoothening it with a piece of white cloth, or flannel, in the direction of the *nap*:....to remove ink from *silk* stuffs, it will be advisable to apply strong distilled vinegar, and wormwood-ashes, to the blotted part, which ought to be well rubbed with these matters, and then cleansed with soap-water.

Red-port on *linen*, we understand, may be almost effectually cleared, by pouring warm milk on the stained parts, while they are in a wet state:.....another, and perhaps more successful, method, is that of dropping the tallow from a candle on such wine-marks before they are dry; and suffering them to remain till the cloth is sent to the laundry; because *ink-spots* may, in this simple manner, be removed from linen.

[*To take ink-spots out of linen*.... Moisten the place with undiluted marine acid, (spirit of salt;) in about 2 or 3 minutes, wash the linen well in cold water....This is dangerous, if continued too long, but it may be managed with care; if the acid be diluted with water, it is apt to burn.

Another....Rub the spot with a piece of lemon, or squeeze lemon juice upon it, and then wash it in warm water.

Mr. HENRY, in his *Epitome of Chemistry*, prefers the oxalic acid, (acid of sorrel) citric, (of lemon) and tartareous acid, which may be applied to the most delicate fabrics without injury: and the same solutions discharge, from paper, written but not printed ink.]

SPRAIN, denotes an extension of the muscles, ligaments, and tendons, without dislocation: it generally proceeds from external inju-

ry; and is attended with pain, swelling, and inflammation. In treating this local affection, the first object should be, to check the swelling, and prevent the inflammatory symptoms. For this purpose, cold, astringent fomentations with water, ice, vinegar, &c. or, in a very recent case, camphorated spirit of wine, must be applied as speedily as possible: to relieve pain, where it is considerable, a few drops of laudanum may be added to the lotion....The regimen recommended under the article INFLAMMATION, will here likewise be proper....During, and for some time after, this treatment, the sprained part should be kept in a state of rest and relaxation.

SPRING, a fountain, or source, whence water spontaneously rises from the bowels of the earth.

Various conjectures have been formed by naturalists, concerning the *origin* of springs; but, consistently with our limits, we shall only observe, that the most plausible theory appears to be that of Dr. HALLEY, who supposes them to originate from the rain and snow waters; which, penetrating through the soil, at length settle in the fissures of the earth, and form fountains or springs.

As water is indispensable to the health and convenience of mankind, many expedients have been devised, with a view to ascertain the particular spots, whence a supply might be obtained: we shall, therefore, state a few indications, or land-marks, by which that necessary article may be discovered.

1. As all mountains are colder in proportion to their height, the evening mist descends on them, particularly in damp situations, much sooner than on the vallies, and thus may indicate the existence of springs.

2. Another observation is suggested by Dr. DARWIN, in order to determine the existence of subterraneous springs, in *rimy* mornings:....moist earth conducting heat better than dry soil, the rime will be dissolved more speedily on those spots which are moistened by springs under ground, than on the adjacent parts.

Lastly, the rise of these natural fountains may be discovered during the winter, in wet ditches, by the growing of brook-lime, water-cresses, or similar aquatic plants: for such vegetables do not thrive in the ditches that become dry in the summer. And Dr. DARWIN remarks, that when those ditches which contain springs, are nearly dry, the direction of the current may be ascertained by the point, to which the leaves of the aquatic plants may *turn*, with as great a degree of certainty as can be effected by a level.

SPRING-GRASS, the SWEET-SCENTED, or VERNAL-GRASS, *Anthoxanthum odoratum*, L. an indigenous perennial, growing in meadows and pastures; flowering in the months of May and June..... This is one of the earliest British pasture-grasses, and occasions the delicate flavour perceptible in newly-made hay. It is eagerly eaten by cows, horses, goats, and sheep; on account of its aromatic taste, and juicy, nutritive nature.....Mr. SWAYNE, however, observes, that it abounds in wet lands, particularly on peat-bogs; and that it appears to be of little consequence; as it is neither very productive to the farmer, nor palatable to cattle, ...Nevertheless, other agriculturists

are of a different opinion; and Mr. SOLE (*Letters and Papers of the Bath and West of England Society*, vol. ix.) conceives that the vernal-grass would be an useful addition to meadows, by sowing it in the proportion of *one-eighth*. This judicious advice, every practical husbandman will be induced to adopt; as it is a well-known fact, that this fragrant herb not only remarkably spreads, and increases in its bushy stalks, when cultivated in favourable situations, but it also effectually checks the growth of moss, in *your* meadows......It is farther remarkable, that the root of this moss possesses a strong odour, resembling that of *musk*....The dried blossoms are, on the Continent, employed for imparting an agreeable flavour to snuff and tobacco. [See GRASS.]

SPRUCE-BEER, a kind of diet-drink, which is prepared in the following manner: Eight gallons of water are first poured into a cask, or other vessel; and a similar quantity of boiling water is added; 16 pounds of molasses are next mixed, together with a few table-spoonfuls of the *essence of spruce* (which is obtained from the cones of the *spruce-fur.)* Half a pint of sweet yeast must now be put in; and the whole, after being well stirred, should be placed in a temperate room, for a few days, till the fermentation ceases. The liquor may then be bottled; and, in the course of a fortnight, it will be fit for use.

[*Another*.....To a four ounce pot of essence of spruce, add three quarts of molasses, two gallons of warm rain or soft-water, and half a pint of good yeast. Stir the whole well, till the liquor bears a froth, then put the mixture into a cask, and fill it with eight gallons of water, shaking it well; set it by for two or three days, to ferment, with the bung open; when sufficiently worked, bung the cask close, and place it in a cool cellar, and in 24 hours it will be fit for use.... If intended for bottling, let the cask stand undisturbed three days before it is drawn off: for a second brewing, the sediment remaining in the cask, may be used instead of yeast. If well-water be used, it should be a little warmed.

The above receipt, the Editor can recommend from experience. But he must beg, that attention be paid to every part of the process; that the cask be clean, the corks sound, and the bottles strong..... The purity of the essence of spruce also, must be attended to, as that article is often greatly adulterated.]

Spruce-beer has a peculiar flavour, which renders it disagreeable to the palate of many persons; it is, however, a most powerful antiscorbutic, and affords a wholesome beverage, particularly during the summer; as it does not affect the weakest stomach.

SPRUCE-FIR. See FIR.

SPUNGE. See SPONGE.

SPUR, a disease to which corn is subject....See CORN and RYE.

SPURGE, or *Euphorbia*, L. a genus of plants, comprehending 110 species; 12 being natives of Britain; the principal of which are the following:

1. The *charatias*, or Red Spurge, grows in woods and hedges, where it flowers in the month of June. The pulverized leaves of this plant, if taken in doses of from

15 to 25 grains, operate as a brisk purgative :....its juice, like that of all the other species of the spurge, is so extremly acrid, that it ulcerates every part of the body, with which it comes in contact. Hence, it is never used internally :....but, a single drop put into the cavity of an aching tooth, is said to have removed the pain, and at the same time destroyed the nerve. This corrosive liquid, however, may, according to Dr. WITHERING, be applied with safety to *warts* and *corns;* as it eradicates them in a very short time.

2. The *helioscopia*, or Sun-spurge. See WARTWORT.

3. The *Cyparissias*, or CYPRUS SPURGE, grows in dry woods (at Enville, in Staffordshire), where its yellow flowers blow in May and June....Goats are exceedingly partial to this herb ; and its seeds afford grateful food to pigeons.... The beautiful caterpillar, which is changed into the Spurge-butterfly, derives its nourishment from the leaves of this species.....[See EUPHORBIUM.]

SPURGE-FLAX. See MEZEREON.

SPURGE-LAUREL, or LAUREL MEZEREON, *Daphine Laureola*, L. an indigenous shrub, found in woods and hedges, principally in the county of York, where it flowers in March and April. The whole of this vegetable, especially the bark of the root, is very acrid : it has been employed with success in rheumatic fevers, operating powerfully as a purgative. It is likewise an excellent vermifuge ; but, as it possesses great acrimony, it ought never to be administered without medical advice, and in small doses, which should not exceed ten grains. On account of its elegant green and yellow flowers, which appear in the early spring, and sometimes in the winter, this evergreen is cultivated in shrubberries ; but it deserves to be remarked that its black berries, though eagerly eaten by pheasants, prove mortal food to man, and all the mammillary animals.

SPURGE-OLIVE. See MEZEREON.

SPURREY, or *Spergula*, L. a genus of plants comprising 5 species ; three being natives of Britain. The principal of these is the *arvensis*, or Corn Spurrey, which grows in corn-fields, and sandy situations ; flowers from July to September. This vegetable is eaten by horses, sheep, goats, and hogs ; but is, according to WITHERING, refused by cows. BECHSTEIN, FUNKE, and other naturalists, however, informs us that the corn-spurrey is not only devoured with avidity by *all* cattle, but is also conducive to their health, while it remarkably tends to increase the milk of cows, and to fatten sheep. Hence this *weed* is industriously cultivated in Flanders ; because it is so far superior to other pasture-grasses, that it continues green till a late period of autumn, and often throughout the winter. Its seeds are eagerly swallowed by poultry, and afford on expression a good lamp-oil : nay, the flour obtained from them, when mixed with that of wheat or rye, produces wholesome *bread*, for which purpose, it is often used in Norway and Gothland.

SQUILL, the COMMON, or SEA-ONION, *Scilla maritima*, L. an exotic plant, growing on the sandy shores of the Levant, especially on those of Spain, and Portugal, whence considerable quantities of its roots are annually imported....

The best sea-onions ought to be sound, fresh, and to contain a viscous juice: they are nauseous, bitter, and, if much handled, are so acrid as to ulcerate the skin.

The squill is a powerful stimulant, promoting the discharge of urine; and, if the patient be kept warm, a profuse perspiration. It is chiefly employed, in cases, where the organs of respiration are clogged, or oppressed with mucus:.... when combined with nitre in the proportion of from 4 to 10 grains of the dried root, with a double quantity of saltpetre, it has been greatly extolled for its efficacy in dropsical swellings, and inflammations of the kidnies. If the squill be taken in a large dose, it operates as an emetic; and, in some persons, as a purgative. It is often prescribed in the form of pills; though, when mixed with honey into an OXYMEL, it affords an useful medicine for obstinate coughs....-The roots of the sea-onion pay, on importation, the duty of 2s. 9d. per lb.

SQUINANCY-BERRIES. See CURRANT, the Black.

SQUINTING, or *Strabismus*, an affection of the eyes, occasioned by the optic axis not converging; in consequence of which, the organs of sight appear distorted.

Improper habits frequently induce this defect, while the eye and its muscles are perfect; for instance, in children, who accustom themselves to view different things at one time; or, who are placed obliquely towards any object that may attract their attention. Another cause is mal-conformation of the retina, or such parts as serve to convey impressions to the point of vision; so that persons thus situated, are obliged to turn the eye from the object to be investigated, in order that they may be enabled to behold it more distinctly....Farther, it often proceeds from weakness, or defect of either eye, so that both cannot be mutually employed. Besides, it may be consequent on affections of the brain, epilepsy, terror, and defluxions of rheumatic humours.

The method of cure to be adopted in this unpleasant distortion, varies according to the cause. Thus, in children, and in cases of weakness of the eyes, it may be remedied by *mechanical contrivances*. Hence, when there is no organic defect in either eye, which is frequently the case with persons who squint from a depraved habit of moving their eyes, the disease may often be cured. Dr. DARWIN remarks (*Philosophical Transactions*, vol. 68), that in all the squinting people he had occasion to attend, one eye was less perfect than the other: these patients are, in his opinion, certainly curable, by covering the best eye many hours in the day; as, by a more frequent use of the weak eye, it not only acquires a habit of turning to the objects which the patient wishes to see, but gains at the same time, a more distinct vision: in both these respects, the better eye is under some disadvantage, which also facilitates the cure. This ingenious physician relates, in the same paper, a remarkable case of a boy, then five years old (now a reputable English clergyman at Edinburgh), who has the misfortune of viewing every object with one eye only at a time. Dr. D. directed a paper *gnomon* to be made, and affixed to a cap; and, when this artificial nose was placed over the patient's real nose, so as to project an inch

between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to exert the eye which was nearest to them. But, having the misfortune to lose his father, soon after this method was begun to be followed, the child was neglected for six years, during which time the habit was confirmed in such a manner as seemed to leave little room to hope for a cure. Dr. D. however, being again called, attempted a second time to remove the deformity, by a similar contrivance. A gnomon of thin brass was made, to stand over his nose, with a half-circle of the same metal to go round his temples: these were covered with black silk; and, by means of a buckle behind his head, and a cross-piece over the crown of his head, this gnomon was worn without any inconvenience, and projected before his nose about two inches and a half. By the use of this machine, he soon found it less inconvenient to view all oblique objects, with the eye next to them, instead of the eye opposite to them.

After this habit was weakened, by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, were blackened all but a quarter of an inch at their summits; these were frequently presented to him to look at; one being held on one side the extremity of his black gnomon, and the other on the opposite. In viewing these, they were gradually brought forward beyond the gnomon, and then one was concealed behind the other; by such means, in another week, he could bend both his eyes on the same object for half a minute together; and, by continuing the use of the same machine, he was in a fair way of being cured.

Lastly, if squinting arise from any adventitious circumstance, such as terror, defluxions of humours, &c. the removal of those causes will also cure the disorder; but, where it originates from mal-conformation of the organs of vision, or has been so long neglected as to become *confirmed*, it is not in the power of art to afford any relief.

Squitch-grass, the blue. See Creeping Bent-grass.

St. Anthony's Fire. See Rose.

St. John's-wort. See John's Wort.

ST. VITUS's DANCE, a spasmodic disorder, mostly incident to young persons of both sexes, from the age of ten to fifteen: it is distinguished by continual involuntary motions of the hands and feet; so that the patient appears in a manner to *dance*, while he is obliged to drag one leg after the other.

Causes:....Worms; suppressed eruptions; checked perspiration, &c. but the peculiar affection of the muscles thus contracted, has hitherto eluded the researches of the physiologist.

However distressing this complaint be to the patient and his friends, it may afford some consolation, that it neither proves fatal nor permanent; and that frequently, after every mean has been employed, it spontaneously disappears. A favourable change may, in general, be expected about the age of puberty.

Cure:....As it is often difficult to ascertain the cause of this malady, it will be proper to administer such medicines as are calculated to carry

off worms (see the article WORM); and to allay the spasmodic motions. With the latter intention, antispasmodics and tonics, namely, asafœtida, valerian-root, wormwood, musk in conjunction with bark and port wine, &c. have often been attended with good effects. Farther, the remedies directed in the EPILEPSY, may also, with advantage, be so modified as to be salutary in this complaint. Lastly, we conceive that the *tepid bath* may always with safety, if not with uniform benefit, be resorted to; especially in an affection which obviously arises from a preternatural irritability of the nerves and muscles. On the other hand, the *cold sea-bath* will probably be of great service, when the skin of a robust patient is not in a dry, contracted state; and when there appears to be a sufficient degree of re-action in the system, to withstand the sudden shock of the water.

STABLE, an edifice erected for the reception and accommodation of horses.

The principal object in building stables, is the *situation*, which ought to be, 1. On a gentle declivity, in order that the urine, &c. may be carried off; 2. On a pure, airy spot; not exposed to noxious exhalations; and, 3. On dry, hard ground. The walls must be moderately thick, and furnished with casements on the north and east sides; both with a view to admit air, and receive the benefit of the rising sun. The windows should, at the same time, be provided with shutters, [or louffers in preference] for excluding the light, in case it be deemed necessary for the animals to sleep during the day.

With respect to the *paving* of stables, it will be advisable to cover the part, on which the horses are to lie down, with oak boards, placed *transversely* upon a level; and which should be perforated with holes, for conducting the urine into the common drain. The other part should be paved with small stones; and the wall contiguous to the rack, ought to be lined with a wainscoat of sound oak.

[For some remarks on the best form of stables, the reader is referred to the article FARM YARD.]

When a stable is designed for several horses, the *stalls* should be made sufficiently wide to enable them to lie down, or turn round without inconvenience; while the partitions ought to be raised so high towards the head, that the animals can neither see, smell, nor molest each other. Lastly, the strictest cleanliness must be observed in the management of the stable, both in order to preserve the health of horses, and to prevent the generation of any contagious effluvia. In case, however, infectious distempers should prevail, it will be necessary to resort to the following process, in order to destroy the contagion: Let half a pound of oil of vitriol, diluted with an equal quantity of water, be gradually poured into a vessel, containing 4 ounces of pulverized manganese, mixed with a pound of sea-salt. The dish ought to be placed on a heated brick; and the operator should carefully avoid the fumes arising from the vitriolic acid; as they will powerfully affect the organs of respiration. See also FUMIGATION.

STAGGERS, or *Apoplexy*, a diorder in the heads of horses, which becomes evident from the drowsiness; bad appetite; watery and inflamed eyes; and the stag-

gering or reeling gait of the animals. The head is continually reclining on the manger; a slight fever prevails; and the discharge of urine is in a very small proportion.

If the disease arise from wounds, or blows on the head, the horse will, in addition to these symptoms, become frantic, particularly after feeding; and, if it fall down, without being able to rise, there will be little prospect of recovery.

Sometimes the staggers proceed from colds, caught by too early turning the animal out to grass, after violent exertions: it will, therefore, be requisite to bleed him freely, and to support the head and shoulders with straw: if he survive the fit, clysters prepared from a strong decoction of senna and salt, or a *purging clyster* must be administered every morning and evening. It has farther been recommended, to blow a dram of the powder of ASARABACCA, once in the course of the day, into the animal's nostrils, in order to promote a discharge: after which, two or three aloetic purges (see HORSE-MEDICINES, vol. iii.) ought to be given; and, to prevent a relapse, small doses, not exceeding one ounce, and consisting of equal ports of cinnabar, antimony, and guaiacum, formed into balls, should be daily administered, for the space of a month.

When the staggers originate from fulness of blood, high feeding, or want of exercise, it is the practice of *farriers*, frequently to take small quantities of blood from the horse, and to give an opening diet, together with scalded bran or barley. It appears to *us*, however, that such bleedings, unless in cases of urgent necessity, might be avoided; by keeping the animal on hay mixed with double its quantity of cut straw, and making him work moderately every day.

[In the first vol. of "ANDERSON'S *Recreations*," is a paper on this disease, which it is now known was written by Col. TATHAM, at present in London, and author of several late and ingenious works..... From the facts collected by Mr. T. it is highly probable, that the disease proceeds, at least in North Carolina, "from the *cobwebs* which bespread the ground every where in autumn; but whether the infectious particles are taken in through the nose or mouth, or both, seems to be yet unsettled."

It appears that it is the cobwebs *moist* with the due, that produce the disease. By experiments, dry cobwebs were found innocent.

These facts are highly worthy of investigation. Dr. ANDERSON observes that the *staggers*, as affecting sheep, is the only disorder of this sort frequent in Britain.]

STAGGERS, in *Sheep*, is a species of apoplexy, arising from too great fulness of blood. It principally attacks young lambs, which fall down; and, if not timely relieved, they speedily perish. The mode of cure generally adopted by shepherds, is to bleed the creatures frequently in the *eye-vein*, and to remove them to a coarse pasture, with a view to prevent the danger of a relapse.

STAINING. See MARBLE; and WOOD.

[STAIR CASE. All stone stairs and landings, projecting from the walls, without any support at one end, are extremely dangerous; their safety, or support, depends on the *supposition* that *every* stone is sound, *every* joint and bearing

geometrically exact, and the walls *compleatly* settled before the stairs are built in. This supposition is generally groundless, or at least uncertain, as events shew. Not long ago, says Dr. GARNET, one of these elegant, but unsafe stairs, tumbled down at the New Opera-House, in the Hay-Market, and another at the Tontine, or Exchange, in Glasgow. And serious apprehensions of a similar accident, were entertained at the house of a nobleman at the west end of the town. Stone stairs when built with good roomy landing-places, and a thin wall to support the off ends of the steps, as recommended by Dr. GARNET, are certainly the best on account of fire..... Many instances having occurred of the inhabitants of houses being burnt from the stairs taking fire below, by which they were deprived of the means of escaping.]

STAR OF BETHLEHEM, or *Ornithogalum*, L. a genus of plants, comprising 35 species, 7 of which are indigenous: the principal of these is the *luteum*, or Yellow Star of Bethlehem, growing in woods, and moist sandy places; where its beautiful yellow flowers appear in April.

All the species of this vegetable are hardy perennials, and prosper in any situation: they may be easily propagated by off-sets from the bulbous roots. These may be preserved for a long time, either in a raw or roasted state; and RUELLIUS remarks, that a wholesome and nutritious *bread* may be prepared from a mixture of the roots and seeds of this plant.....It is eaten by horses, goats, and sheep, though not relished by hogs; and is totally refused by cows.....See also CHEESE.

STAR-GRASS, or *Callitriche*, L. a genus of plants, consisting of four species, two of which are indigenous, namely: 1. The *verna*, Vernal Star-grass, Water-Starwort, Water-Fennel, or Star-headed Water-Chickweed, grows in ditches, ponds, and slow streams: it flowers from April to August. 2. The *autumnalis*, or Autumnal Star-grass, abounds in ditches and still waters, where it flowers in August.

Both these vegetables grow so thickly matted together, as to enable a person to walk over them, without sinking: hence, they may be advantageously planted, with a view to consolidate swampy, or marshy grounds, so as to prepare them for tillage.

STAR-WORT, the SEA, or *Aster Tripolium*, L. a native perennial, growing in salt-marshes, both on the sea-coast, and in those which are more distant from the shore: it flowers in the months of August and September. This vegetable is eaten by goats and horses; but is not relished by sheep, and totally refused by hogs. From its thriving in inland situations, the Sea-Starwort has been conjectured to indicate the presence of subterraneous salt-springs.

STARCH, or *Amylum*, is a preparation from wheat, obtained by steeping the flour of that grain in cold water, then straining it through a cloth, and suffering the farinaceous particles to subside. In many places, however, it is manufactured in the following manner:

Pure wheat is put into tubs of water, and exposed to the heat of the sun, to induce a proper degree of fermentation; the water being changed twice every day, for six or eight days, according to the

warmth of the season. When properly softened and fermented, it is poured into canvas bags, which are worked or beaten on a board, placed over an empty vessel, in order to extract the mealy part. When such vessel is filled with the *liquid flour*, a reddish fluid appears on the surface, which must be carefully skimmed, and pure water added; when the whole ought to be briskly agitated, and allowed to subside. As the sediment increases, the water is gradually drained, and at length the starch is formed into cakes, which are cut in small pieces, and dried for use.

Good starch, when dry, is pulverulent, tasteless, without odour, insoluble both in cold water and ardent spirit: on the addition of boiling water, however, it forms PASTE, or PASTRY, of which the reader will find an account.....It is one of the constituent parts in all mealy or farinaceous seeds, fruits, roots, &c. of plants; though some vegetables contain a much larger proportion of it than others. Thus, the Wake-Robin, and White Bryony, afford more starch than potatoes; and the Salep-roots, especially those of the Meadow-ORCHIS, for the greatest part, consist of that valuable substance.

Starch being the basis of *hair-powder*, and also of extensive utility for domestic purposes, various experiments have been instituted, with a view to ascertain such vegetables as might be advantageously substituted for wheat.....As the reader will find a recapitulation of those useful plants which have been mentioned throughout this work, in the *General Index of Reference*, we shall, at present, only notice the method adopted by Mrs. GIBBS, for preparing starch from the roots of the Wake-Robin; for which the Society for the Encouragement of Arts, &c. in 1797, presented her with their gold medal. She observes, in her communication, that such roots are found in the Isle of Portland, in the common fields, whence they may be dug out, cleansed, and pounded in a stone mortar with water. The whole is then strained, and the starch settles at the bottom: a peck of these roots produced, upon an average, about four pounds of starch, which was sold at 11d. per pound.....See also WAKE-ROBIN.

[Starch abounds in a great variety of vegetables. Mr. PARMENTIER has shewn that the roots of 22 vegetables yield starch, and that the seeds of nine plants and trees contain it nearly pure. He omits however, the *Arum Tryphyllum* or Indian turnip, which probably does not grow in France..... See TURNIP (Indian).

Dry mealy Potatoes yield a large proportion of starch, which is preferable, *when properly prepared*, to the starch of wheat flour. The following is the method recommended by BAUME.

Rasp *clean washed* potatoes, collect the pulp in a tub, and mix it with a great quantity of *clean* water. Place two wooden rails on the brim of another *very clean* tub to support a sieve, which must not be too fine. Throw the pulp and water into the sieve; pour fresh quantities of water on the pulp, till the clear water runs through. In six hours the water will have deposited the flour suspended in it; when the water is to be poured off, and a great quantity of very

clean water poured upon the flour remaining at the bottom of the tub, which is to be stirred up in the water, and the whole is to stand quiet till the day following. The flour will then be found to have settled at the bottom of the tub: the water is again to be poured off; the flour washed in a fresh quantity of pure water, and the mixture passed through a silk sieve pretty fine. The whole must once more be suffered to stand quiet till the flour is settled; if the water above it is clean, the flour has been sufficiently washed; but if the water has any colour, it must be again washed.

When perfectly washed, take out the flour, and place it upon wicker frames covered with paper, and dry it, properly defending it from dust. When dried, pass it through silk sieves, to divide any clotted lumps that may remain; and steep it in glass vessels stopped with paper only.]

STARLING, the COMMON, or *Sturnus vulgaris*, L. an useful bird, inhabiting various parts of England. It is about eight inches in length, and weighs from three to four ounces: the plumage is black, spotted with blue, purple, or yellow, though sometimes with white dots; and the beak is yellow.

Starlings breed in hollow trees, the eaves of houses, in ruins, and even on lofty cliffs; where they construct their nests of straw, the fibres of roots, and similar materials: the female lays from 4 to 7 pale-greenish, ash-coloured eggs: the young afford a delicate repast; but the flesh of the old birds is so uncommonly bitter, from devouring worms and insects, that it cannot be eaten. As, however, these creatures have a pleasing note, and display great docility, they are frequently taken by bird-lime or other means, and taught to imitate human speech, in the same manner as PARROTS.

The breeding of starlings, in a wild state, ought to be encouraged by every rational farmer; because they are of extensive service, by devouring noxious vermin, and eating no grain or seeds of plants, or other fruit, unless compelled by necessity.

STAVESACRE, or *Delphinium Staphisagria*, L. an exotic plant, growing in the southern parts of Europe, and particularly in Italy, whence its rough, blackish seeds are imported. They possess a disagreeable odour, and a nauseous, bitterish taste. Their chief use, at present, is, for destroying fleas and similar vermin; and if *horses*, or other animals, be occasionally washed with a decoction of the seeds of the stavesacre (in the proportion of one ounce to $1\frac{1}{2}$ pint of water), all *nits*, &c. will be effectually exterminated.

These seeds were formerly celebrated for their purgative qualities; but, on account of their violent operation, are now exploded from the list of internal medicines. If, however, a small portion of such poison should have been accidentally swallowed, the most proper *antidote* will be, either an immediate and brisk emetic; or, if some time have elapsed, large draughts of oily, mucilaginous, milky, or other demulcent liquors, should be swallowed, with a view to prevent an inflammation of the intestines.

STAYS, an article of female dress, which is usually made of canvas or dimity, supported by whale-bone, and laced behind.

Few articles are of greater importance to the health and comfort of females than stays: hence, instead of being manufactured from *hard* substances, they ought to be made of such as would allow a free motion of the limbs; for instance, felt, shamois-leather, &c.; without any stiff materials. So great, however, is the prevalence of custom, that such absurd *casements* are still retained by the most numerous class of women, who lace themselves in whale-bone, to the great detriment of their constitution. To this cause we may justly attribute many of the cancers, hard tumors, and similar affections of the breast; nausea; indigestion; compression of the ribs; DISTORTION *of the spine;* and a long train of painful disorders. To prevent such frequent disasters, we recommend the use of corsets made of the pliant and elastic texture used for stockings, or gloves; which, if properly lined, and worn with a moderate compression, will not only afford sufficient warmth, but also contribute to the preservation of an erect form. In short, we find from history, that among the most elegant nations of antiquity, namely, the Greek and Roman women, never resorted to such cumbersome articles of dress.

In March, 1801, Mrs. LLOYD GIBBON, of Sackville-street, Piccadilly, obtained a patent for new-invented stays, for women and others. They consist of a back and front-piece, both of which are supported by strips of whale-bone, that are nearly parallel: the two pieces are joined by means of hooks and eyes, or similar contrivances, which meet at the side, and admit of being accommodated to the size of the wearer. Farther, these stays are made of such a length, as not to produce any inconvenience on sitting down; and are asserted to be principally calculated for correcting deformities, as well as for supporting the abdomen, where this aid should be required; as they may be lined and stuffed, or *padded*, at pleasure.

STEAM, denotes the visible, moist vapour ascending from hot or boiling liquors; and also from substances containing humidity, which is easily evaporated by a degree of heat, that is insufficient for their combustion.

Steam being one of the most powerful agents in Nature, is an object of great importance to manufactures, as well as to horticulture. Hence several machines, known under the names of *steam-engines*, have been invented, with a view to facilitate the operations of extensive iron-works, and also to expel noxious exhalations from mines. Among these contrivances, that by Mr. JAMES WATT, of Birmingham, first deserves honourable mention for its ingenuity; next in order of time, is Mr. JONATHAN HORNBLOWER's machine, for raising water or other liquids by means of fire and steam, for which a patent was granted in 1781; then Mr. JAMES SADLER's engine for diminishing the consumption of steam and fuel, as well as gaining a considerable effect in time and force; in consequence of which, he obtained a patent in June, 1791; and lastly, the Rev. Mr. EDMUND CARTWRIGHT's improvements in constructing, working, and applying steam-engines; for which a patent was granted to him in November, 1797......As, however, a

description of these respective inventions would be unintelligible, without the aid of numerous engravings, the curious reader will consult the 4th, 7th, and 10th vols. of the *Repertory of Arts*, &c. where full specifications are inserted, and illustrated with plates.

Farther, steam may be made subservient to the purpose of promoting vegetation; by means of flues and other contrivances, conducted beneath hot-houses:....with this economical design, various successful experiments have been made under the inspection of the Earl of DERBY, and also by THOMAS WAKEFIELD, Esq. of Northwich. Our limits, however, being circumscribed, we cannot specify the machinery invented by Mr. W.; because such account would necessarily be deficient without an engraving. We shall, therefore, only remark, that during the last five years, the steam has been used in his vine-house, with the best success; the plants vegetating with uncommon luxuriance throughout the summer; and producing "the greatest abundance of large and well-flavoured fruit." Another advantage attending this *new* method of raising fruit, is, that it prevents the depredations of the *red spider*: because, if a sufficient volume of steam be applied, that destructive insect never appears. For a more minute account of the numerous trials made with Mr. WAKEFIED'S flues, the reader is referred to the 18th vol. of the *Transactions of the Society for the Encouragement of Arts*, &c.

Steam may, with equal advantage, be employed in domestic economy, and particularly in cooking. Thus, *steamed* potatoes are always more wholesome and nutritious, than such as are boiled in water; and Dr. DARWIN observes, that if the heat of the steam could be increased after it has left the water, the art of boiling all vegetables might be considerably improved; and thus the mucilage, abounding both in potatoes and flour puddings, and also in the roots, seeds, stems, leaves and flower-cups of plants, may be rendered more nutritive, and probably, more palatable. See also the article COOKING.

[STEAM-DISH. This very useful contrivance is described in the 4th vol. of the *Repertory of Arts*. In Philadelphia, it is a very common practice to surround meat, with potatoes, in an earthen dish, which is sent to the oven. The potatoes are thus soddened, and the meat is hard and dry, and acquires a very unpleasant taste from the variety of exhalations with which it is surrounded. The steam-dish obviates all these inconveniencies. "It is made of tin, or earthenware; (for a family of six or eight) twelve inches by nine, at the top, and nine by seven, at the bottom, four and a half inches deep, on the slant rim, and three inches, in the clear, under four resting knobs, (a little below the top,) which space is to be occupied by the meat of which the pastry is made.

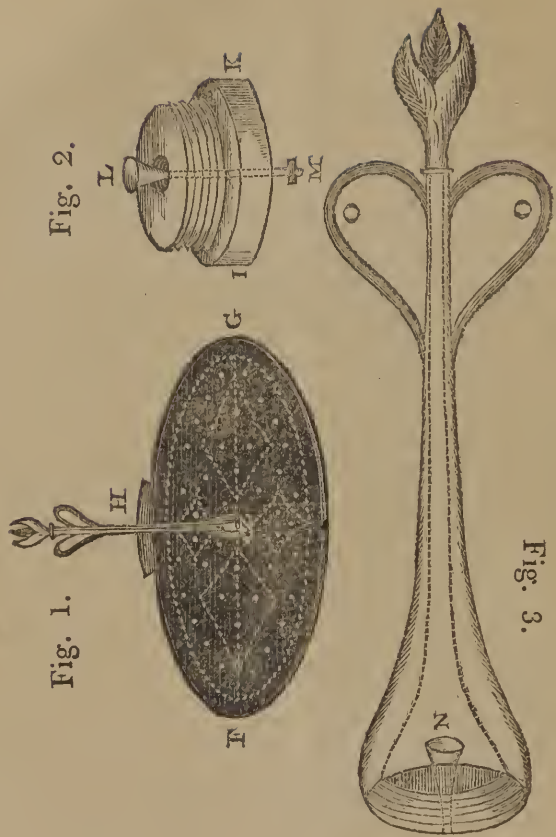


Fig. 1. Is the perforated cover, with its steam-pipe, made exactly to fit the dish, when resting on the knobs.

I K L M *Fig*. 2. Is the lower part of the steam pipe, with its valve and screw; (one third less than the real size) it is soldered upon the perforated cover, as at Z, leaving a sufficient hole in the centre of the cover, for the rising of the steam, and play of the valve L, thrown up by the steam whilst the pasty is baking. M is a nut, screwed on to a piece of wire fixed at the bottom of the valve, to prevent the steam from forcing it too high in the steam-pipe.

Fig. 3. Represents the steam-pipe, with its leafy ornament: it

screws on to fig. 2. and is sufficiently hollowed about the screw part, (as the dotted lines shew) to suffer the valve N to play freely.... The loops O O are for the purpose of lifting off the perforated cover to serve out the meat, when brought to table.

Directions for making Potatoe-pastry.

Take of beef, mutton, veal, or other meat, two pounds; season it, and place it in the bottom of the steam-dish, with a bit or two of butter, (two ounces is enough for the whole pastry, including what is rubbed into the mashed potatoes), and a sufficiency of water to draw a good gravy; a few slices of carrot may be added, if the pastry is made of mutton.

Take also of mealy potatoes, one gallon; boil, peal, and mash them; rub into them a little butter: when washed, place the perforated cover over the meat, and put the potatoes smooth and even upon it, sloping them up, and pressing them very closely round the edges of the dish. The pasty may now be sent to the oven, which, if quick, will bake it in an hour.

When the pastry is removed, the air closes the valve, the steam then rises through the perforated cover, and incorporates with the potatoes.

When served up to table, the potatoe crust may be cut off and served round; then by lifting up the perforated cover, you will find an excellent dish of beef, &c. swimming in gravy, which is to be taken out and eaten with potatoe crust; and a more palatable mixture or cheap dish, cannot be served to a family.]

STEEL, is iron refined in the fire with certain ingredients that render it white, and impart to it a harder and finer grain than that of the original metal.

Iron is converted into steel, either by *fusion*, or by *cementation*. The former method is employed for making steel immediately from the ore, or from the crude, cast metal. In the latter, bars of iron are placed in furnaces, with a stratum of charcoal between each; till the pile is raised to a sufficient height. The whole is then closely covered, to prevent the access of the air; when a strong fire is kindled, and uniformly continued during the whole process. The surface of the metal, manufactured in either way, generally exhibits numerous vesicles, whence it is called *blistered steel;* but these may be removed by repeated ignition between red-hot coals, and by forging.

The finest metal of this description, is the *Damascus-steel*, which is imported from Syria; but the process pursued in the Turkish manufactories, is not accurately known in Europe. The *German-steel* is made by breaking the *blistered* bars into small pieces, which are exposed to the strong fire of a furnace: these are next welded, and extended the length of about 18 inches, when they are doubled; welded a second time; and at length drawn to the requisite size and shape. The celebrates *Brescian-steel* is obtained by *roasting* the iron-ore in strata, with layers of wood between each; and, when these are sufficiently smelted, the metal is taken out of the furnace, broken to pieces, picked, and washed in troughs of pure water. It is next conveyed to an oblong square

cavity, termed the *fluxing-bed*, which is strewed with a mixture of finely-sifted ashes and sand, that are carefully compressed. A stratum of charcoal is then laid on; the smelted metal is gradually added; and, at the end of three or four days, the conversion is completed.

[For an account of the mode of making steel by cementation, see the *Transactions of the Manchester Society*, vol. 5; and for information on the subject generally, see TILLOCH'S *Philosophical Magazine*, and NICHOLSON'S *Philosophical Journal*, in both of which much interesting matter may be found.]

The best steel manufacured in Britain, is known under the name of *cast-steel*. It is prepared from the common blistered metal; which, being broken to pieces, is put into proper crucibles, with a *flux*; and, after the fusion is effected, the metal is cast into ingots, when it undergoes the operation of *tilting*, and is at length tempered, by repeated ignition and immersion in water.

In 1801, a Mr. EGGS obtained a patent for a new method of *bending* steel. After giving the necessary shape to the blade, spring, or other article, it is extended over a convex piece of iron, denominated a *flat*. The bent steel is next stricken repeatedly with an iron machine, resembling a chissel, that cuts into the former, and completes the bending; by which practice he conceives, that considerable labour will be saved in the manufacturing of springs, trusses and surgeons' instruments.

Rusty steel may be cleaned, by first anointing it with sweet-oil, which in the course of two or three days will soften the rust; afterwards wiping it dry with clean rags, and polishing the tarnished parts with PUMICE-STONE or EMERY, by means of hard wood: but the most effectual composition for giving a high degree of lustre to steel, is a paste made of levigated blood-stone and spirit of wine.

STEEL-YARD, or STILYARD, is one of the most ancient machines for ascertaining the weight of bodies, by its counterpoise. It is alluded to in the Pentateuch, and to this day used by the Arabs, and all the asiatic nations. The Greek and Roman goldsmiths preferred it to the *balance*, which was the instrument used by the people.

The steel yard consists of a lever of unequal arms; and, in its most perfect form, is constructed on the principles of the usual balance; to which however it is greatly inferior, in point of minute accuracy. See BALANCE.

There is another species of *patent steel-yard*, consisting of an elastic spring, which is confined in a tube; thus serving by its expansion, as a substitute for the long arm, and pointing out the weight of substances, by marks made on the moveable perpendicular bar in its centre. It would be superfluous to enter into a detailed description of these *portable* machines: let it therefore suffice to observe, that such contrivance is not sufficiently accurate to determine the difference of *ounces* or *drams*; though it may answer the purpose of weighing larger quantities; provided it be properly handled, and preserved from moisture, or *rust*.

STIRRUP, a semi-circular machine, manufactured of steel, plated iron, &c. serving to support the foot of the horseman: as it en-

ables him to mount, and to maintain a due equilibrium, while seated on the animal.

Without entering into an historical account of this contrivance, the utility of it is obvious. Hence, an ingenious artisan, Mr. KELLY, of the Strand, London, several years since, obtained a patent, which is now expired, for manufacturing stirrups, one side of which opens by means of a spring, if the rider should accidentally be thrown off his seat, or otherwise be entangled; in order to prevent dangerous injuries often arising in consequence of being dragged by the horse. We understand, however, from the patentee, that this invention is not so effectual in preventing danger, as his lately contrived stirrup-leathers, with a spring beneath the saddle: thus, if the horseman happen to fall off, both the stirrup and the leather will be immediately disengaged. As the price of the whole appartus is not considerably raised by this useful addition to a *hunting-saddle*, we recommend it to the notice of our readers.

STOCK-BILL: See HERB-ROBERT.

STOMACH is a membranous viscus, serving to receive and digest the various articles of food, conveyed through the mouth and gullet, for the nutrition of the body. It is situated in the epigastric region (see ABDOMEN), towards the left side, in the form of a horizontal, long sack, furnished at each end with an orifice, namely, the upper or left, called the *cardia*, where this organ is connected with the gullet; and the inferior, or right opening, termed the *pylorus*, by which it is united to the intestines.

As the function of the stomach is of the first importance in the animal economy, it will be useful to give a concise view of the principal affections to which it is liable.

If foreign substances have, by accident, been swallowed, such as nails, stones, pieces of bones, coins, knives, &c. the proper remedies will be those of a fat or oily nature, namely, castor-oil, butter-milk, spermaceti, mucilages, &c. clysters of similar liquids; in order to sheath the internal membranes against injury; and, in consequence of which, indigestible bodies are generally evacuated with the feces, though sometimes not without pain; so that, in some instances, they have proved fatal. The farther treatment is stated, vol. iii. p. 220, and vol. iv. p. 72.

Of a more serious complexion, however, is an INFLAMMATION OF THE STOMACH, or *Gastritis:* the principal symptoms of this malady are, violent fever of the malignant kind; anxiety; intense heat and pain in the epigastric region: nausea and vomiting attended with hiccough.

Causes:....Acrid substances, for instance, glass, corrosive sublimate, arsenic, &c. too large quantities of nitre; suppressed perspiration; repulsion of the gout, particularly in plethoric and bilious habits; violent passions; cold draughts when the body is heated; though it may also arise from external injury sustained in other parts, such as the brain, &c.

This dangerous malady, generally terminates between the fourth and eighth day. If the symptoms continue without intermission, and become more violent, a mortification may be apprehended: thus,

sudden cessation of pain; low pulse, and great weakness, denote that gangrene has taken place; but, in less urgent cases, where no remarkable changes happen for several days, a more favourable event may be expected; though, when the affection proceeds from injuries in other parts, or the swallowing of poisons, it generally terminates in death.

Cure:....The chief remedy to be resorted to here, is immediate and copious bleeding, after which a blister ought to be applied to the pit of the stomach: great benefit has also been derived from emollient, and mildly opening clysters. The patient's beverage should be of a diluent, mucilaginous, or oily nature, and taken in small quantities; the latter will prove salutary, where the irritating substance has, for some time, remained in the stomach. If the disorder originated from corrosive poisons, the most proper means of decomposing them, and of counteracting their effects, will be timely and copious draughts of a solution of soap; or sulphureous waters; warm baths, and the subsequent use of mucilaginous liquids....See vol. i. p. 121. After the cure has been successfully effected, the convalescent should be cautious in his diet, avoiding all coarse and heating food; he ought likewise carefully to keep his stomach and feet warm, especially in changeable weather.

Another species of *gastritis*, is the *erysipelatous*, which occurs more frequently than is generally understood; the signs by which the existence of this affection may be ascertained, are as follow: the mouth and fauces appear inflamed; there is pain at the pit of the stomach, attended with frequent vomiting, and a slight fever. The disorder often changes its place, and sometimes spreads through the whole alimentary canal, where it occasions vomiting or diarrhœa. In most instances, it proceeds from acrid substances introduced into the stomach, and from internal causes, the nature of which has not been hitherto discovered; though it also frequently appears as a symptom of putrid fevers, and during convalescence in general.

Cure:...When this inflammatory complaint arises from acrid substances, it will be necessary to take copious draughts of warm, bland liquids, with a view to excite vomiting, by which it may be removed; or, if it proceed from mineral poisons, recourse should be had to the antidotes mentioned under their respective heads..... Bleeding, in this case, is neither advisable nor safe, especially if the patient be in a debilitated state: on the contrary, small quantities of vegetable acids, and the careful use of the Peruvian bark, will be productive of good effects.

With respect to the method of treating INDIGESTION, we refer the reader to that article.

STONE, or *Lithiasis*, is a concretion of calcareous matter, formed in different organs of the body, but particularly in the kidnies, urinary passage, and biliary ducts; though other parts are not exempt from its influence: thus, accumulations of this kind have frequently been discovered, upon dissection, in the heart, brain, lungs, intestines, &c. of various size, shape, weight, and number. There are instances, where more than 200 small stones have been gradually voided by stool.

An inquiry into the nature of

these morbid productions being foreign to our purpose, we shall briefly state, that they probably originate from a deposition of certain particles of the blood, which cohere to any small body, they may find in their passage, thus forming the nucleus or basis. Hence we shall confine our attention to the practical treatment of this dreadful malady, in the instances before mentioned; and commence with the *urinary stones*, as being the most frequent. These are situated either in the kidnies, urinary ducts, bladder, or urethra.

Symptoms of the stone in the kidnies :....An obtuse pain about the loins; nausea and vomiting; small pieces of calcareous matter are discharged with the urine; but, if the concretion be settled in the bladder, an uneasiness will be felt at the end of the urinary passage, especially in emitting the water, which suddenly stops; or, it can be passed only when lying on the back: the urine is of various colours, and often tinged with blood; and, if the accumulation be of a considerable size, a fixed pain prevails about the neck of the bladder. More certain signs, however, for ascertaining the presence of a stone, are the following: 1. when the *discharge* of urine is accompanied with small pieces of such stony matter; and, 2. by *sounding*, which is performed, either by the introduction of the finger into the anus, or of the catheter into the bladder.

Causes :...This distressing affliction may be induced by a great variety of circumstances, especially by improper articles of diet (see GRAVEL): though, in some countries, it is endemial, where a peculiar disposition in the habits of the people promotes its formation. These painful concretions have, likewise, been observed to be very common in the countries provided only with hard spring waters, which constitute the daily beverage of the inhabitants: they may also arise from the copious use of acids, and certain wines, for instance, Moselle and Rhenish, or Old Hock; not less than from cheese, and other gross aliment. Farther, well-attested instances have occurred, in which this excruciating disorder was occasioned by the shot swallowed with game, and even by the dust from mill-stones, mixed with the flour.

During the passage of stones from the kidnies into the bladder, the patient is afflicted with pain, vomiting, &c. which form the *paroxysm* of the *gravel* and *stone*; being sometimes even attended with inflammation (see KIDNIES). In the bladder, they are mostly productive of pain; strangury; bloody urine; inflammation; though in some instances they have remained in a dormant state for a considerable time; and, unless removed by proper means, death closes the scene.

Cure :.....An endless variety of remedies, under the name of *lithontriptics*, have been recommended, for dissolving the stone; but as an account of all these pretended specifics would be equally tedious and useless, we shall only mention such as appear best adapted to the purpose. A preparation, which formerly stood in great repute, is the *caustic ley*, which, however, requires mucilaginous or gelatinous drink as a vehicle: thus, it was administered with great secrecy by an empiric of the name of CHITTICK, to whom the

patients sent a vessel containing veal-broth, which he returned with the medicine mixed in the liquor, and secured by a lock: for this exposition we are indebted to Mr. Blackrie. It is evident,that great caution is requisite in the dose of so active a medicine. Considerable benefit has been derived from the use of water impregnated with fixed air, as directed by Dr. Falconer....An infusion of the seeds of wild carrot (*Daucus sylvestris.* L.) sweetened with honey, is a simple and much esteemed remedy....The late Dr. De Haen, recommended the Bear-whortleberry (*Arbutus Uva ursi*, L.) as a most efficacious remedy for the stone: it may be taken in doses of from one scruple to half a dram in powder, twice or three times a day; or, in the form of an infusion thus prepared: Take of bear-whortleberry leaves three drams, and boiling water one pint: after simmering for one or two hours, the liquor should be strained: and from two to three table-spoonfuls may be given twice or three times a day....Lime-water has likewise proved beneficial in this complaint, both when taken internally, and injected into the bladder....Another simple remedy has been prescribed with great success by Dr. Macbride: thirty berries of raw coffee ought to be boiled in a quart of pure water, till it acquire a deep greenish colour; of this liquor about half a pint is to be taken, morning and evening, with 10 drops of sweet spirit of nitre: during such course, the bowels should be occasionally opened, by a dose of castor-oil. Similar attention ought to be paid, when any of the other remedies are administered; and their operation may also be assisted by the use of mild diuretics.

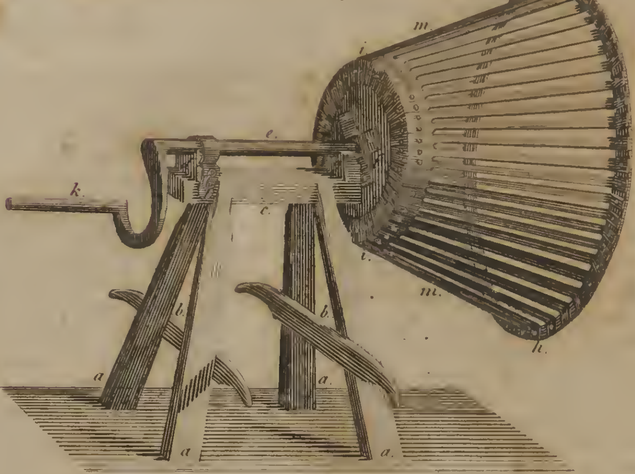
[Jelly made of black-berries, has obtained much credit in the United States for relieving this painful complaint. A mixture of the juices of common garden leeks, and horse mint, taken every day, has been also said in our papers, to have effected a cure in Virginia, in a clergyman: but it is not known what plant was used under the name of *horse mint*, as there are several, bearing that appellation. The intentions of the humane publisher are therefore entirely defeated; and hence the *importance of fixing the true botanical name* to a plant, when speaking of its virtues.]

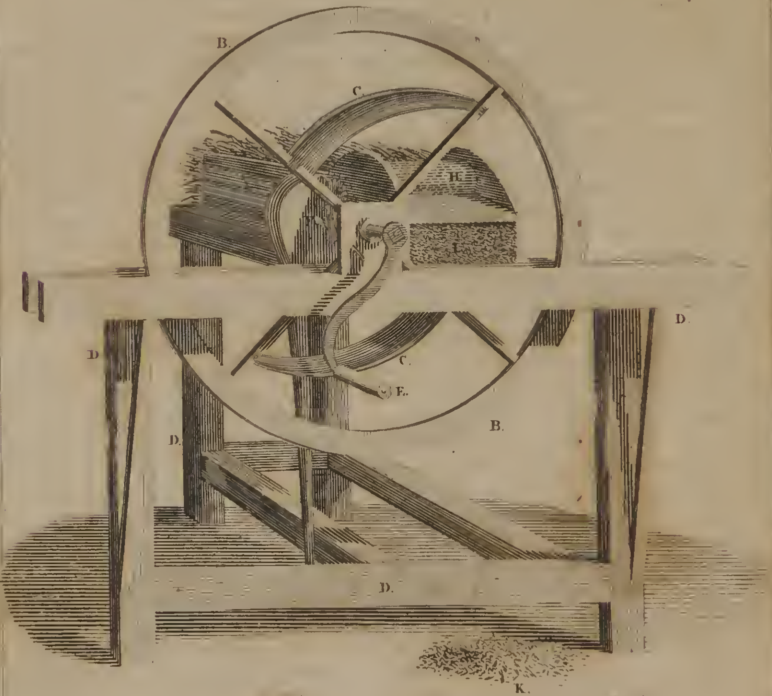
In their diet, patients should avoid coarse and heavy provisions, such as salted, dried, or smoked animal food, especially substances of an oily nature, and all high-seasoned dishes: farther, red-port, Rhenish, and Moselle wines, are uncommonly pernicious; as they naturally promote the accumulation of stones: the beverage ought, therefore, to consist of cooling diluents, in which some mucilage of gum arabic or tragacanth is dissolved....Symptoms of violent pain may be relieved by emollient clysters with opium.

Should, however, all endeavours of *dissolving* the stony concretion prove abortive, recourse must be had to an *operation*, as the only eventual means of extirpating the disease. If the stone should be retained in the urinary passage, speedy application must be made to a professional man; because delay, or neglect, cannot fail to increase the evil.

Gall-stones, or concretions formed in the biliary ducts, are of

Machine for clearing land of Stones.





Straw Cutter.

various size and colour. There is a fullness and pain about the stomach; loss of appetite; languor; nausea; colic; vomiting; and restlessness: the eyes have a yellowish appearance; and jaundice is a frequent attendant on the disorder.

With a view to expel such biliary concretions, the patient may first resort to a warm bath, and then take a gentle emetic; though, in plethoric habits, or if the pain be violent, a small portion of blood may be drawn from the arm, and an opiate given; in order to allay the spasms. But, where the symptoms do not abate after the second bathing and emetic, medical advice will be indispensable.....In slight cases, a decoction of the Soap-wort, or of Dandelion and Dog's-grass, in which a few drams of *vitriolated kali* are dissolved, has been found of effectual service. Great benefit has, likewise, been derived from the liberal use of *acetated kali*, especially if administered at an early period. BRUGNATELLI, has for some time employed with great success, the *acidulated carbonate of lime.*

In all calculous affections, the body should be regulated by the mildest laxatives, the good effects of which may be still farther promoted by moderate exercise on horse-back; though the same caution ought to be observed in this respect, as well as in the use of emetics; for every violent effort, or concussion of the viscera, tends to aggravate the complaint.

STONES, in general, are defined to be hard, solid bodies, which are neither soluble in water, nor malleable. They are formed in the progress of time, within the bowels of the earth, by the gradual accretion of earthy particles; which, by different combinations, acquire various degrees of hardness.

Stones have, by mineralogists, been divided into numerous classes, according to their respective consistence, colour, form, and other properties: but, as we state the most valuable kinds and species of these fossils, in alphabetical order, we shall in this place only remark, that the practice of indiscriminately collecting stones from land, is productive of great disadvantage, because it tends to diminish its fertility. (See also vol. i. p. 107.) There are, however, certain situations abounding with stones, that might be usefully employed in repairing roads:....the usual mode of gathering them by hand, or separating them from the soil by means of an iron or wooden riddle, being equally troublesome and expensive, we have procured the [annexed plate] of a machine for clearing land from stones, and also for sifting sand or gravel: it was invented by PETER FRANCIS PONTI, an ingenious Italian mechanic, on whom the *Patriotic Society of Milan*, conferred a premium of 16 scudi, and a silver medal.

a, *a*, *a*, *a*, are four wooden feet, serving to support a beam, to the ends of which are fixed two pieces of wood, *d*, and *g*, containing the iron axis *e*.

A hoop of iron is fastened over such axis, by means of a hook, *l*, to prevent it from being raised up by the weight of the *receiver* or basket, marked by the letters *i*, *m*, *h*; *i*, *m*, *h*.

b, *b*, are two cross pieces, fixed to the inner surface of the feet; and which contribute to strengthen the machine, and to keep it steady.

They are made to project in the form of handles, for the greater convenience of transporting the implement to different places, two men being thus enabled to carry it with ease.

k, is a continuation of the iron axis, *e*, so as to form the handle of the basket; and, on turning it round, the basket moves in a circular direction: the axis is fixed to the bottom of the receiver by a cross of iron, *f*, or, such axis may be made to pass through the basket, and be so firmly attached to its inner surface, as to support its rotary motion.

The receiver described by the letters *i*, *m*, *h*; *i*, *m*, *h*;. consists of a thick wooden bottom, to which are fastened (by means of nails represented by black dots) the iron bars, of which all its sides are composed. These bars extend in an oblique direction to the bottom; so that the diameter of the outer periphery, *h*, *h*, is double to that of the bottom: they are equal in length to the diameter *h*, *h*; at which part they are fastened to a strong iron hoop.

The original basket delineated in our figure, is nearly two Paris feet in diameter; and all the other parts are constructed accordingly: the size of the machine may, however, be enlarged, or diminished, as occasion requires. But, as the spaces between such bars would be disproportionally wide, in case the latter were throughout of an equal size, or breadth, these are made somewhat round towards the letters *i*, *i*; becoming gradually broader as they approach to *h*, *h*; so that the spaces between the bars do not increase in proportion to the width of the basket.

Lastly, in case such bars be not sufficiently strong, they may be supported by fixing another iron hoop round them, at *m m*. And, if this machine be designed to sift sand or gravel, as well as to clear land from stones, a sieve of iron wire may be fastened around it; and the interstices of which may be enlarged or diminished, according to circumstances.

In employing this machine, it must be placed at one end of the field; two men, furnished with spades, should place themselves in the front, and throw the earth dug up into the basket, which may be turned round by a boy, or any other person. The soil and stones strike against the wooden bottom, and fall upon the bars, being whirled round by the rotary motion of the receiver. During such revolution, the sand, small stones, and earth, fall through the interstices of the bars on the ground, while such as are larger will be thrown to a certain distance from the basket into a trench, made for their reception. When the labourers are so far advanced that they cannot, without difficulty, supply the basket, it will be necessary to spread the sifted parts on the surface, and to remove the machine by means of the handles *b*, *b*, so as to be exactly over the stones already separated. Thus, the work may be continued in a similar progression, till the land be properly cleared.

The most favourable time for this agricultural labour, will be during very temperate weather; when the ground is neither so moist as to adhere between the interstices, and consequently to diminish the utility of the machine; nor so dry and dusty as to be troublesome to the labourers. In such

seasons, stony land may be greatly improved; as the stones will be buried in those spots to which the roots of annual plants do not extend; and in which neither trees nor shrubs will prosper.

[For an account and plate of a machine to raise heavy stones and other weighty substances, see article WEIGHT.]

STONE-CROP, or *Sedum*, L. a genus of perennial plants, comprising 31 species, 9 being indigenous; of which the following are the most remarkable:

1. The *Telephium*, or Orpine Stone-crop. See ORPINE, the Common.

2. The *acre*, WALL-PEPPER, BITING, or PEPPER STONE-CROP, grows on the surface of walls, roofs, rocks, and in dry pastures; flowers in June or July. This vegetable is eaten by goats, but refused by horses, cows, and sheep. It continues to vegetate, while suspended in a chamber: being very acrid, if applied externally, it excites blisters; but, when taken internally, occasions vomiting.... According to Dr. WITHERING, it is an excellent remedy in scorbutic cases, and in quartan agues: a table spoonful of its expressed juice operates powerfully as a purgative. At present, however, it is seldom employed; though, on account of its active properties, the wall-pepper promises to be an useful medicine, when administered with judgment.

3. The *reflexum*, or YELLOW STONE-CROP, thrives on walls, roofs, and rocks, where its bright yellow flowers appear in July.

4. The *rupestre*, or ROCK STONE-CROP, grows principally on St. Vincent's rock, near Bristol, and on the Chedder hills, in Somersetshire. It differs from the preceding species only, in its smaller flowers, which likewise blows in July.

Both vegetables last mentioned, having an agreeable, pungent taste, are cultivated in Holland and Germany, where they are esteemed as ingredients in salads. They may be easily propagated, by planting either their roots, or the cuttings of the shoots in a moist soil, where they will readily take root, and spread with great luxuriance.

STORAX, a fragrant gum-resin, exuding from incisions made in the Common Storax-tree, or *Styrax officinalis*, L. a native of Italy and the Levant, where it flowers in July.

The best storax is obtained from Asiatic Turkey, in small, irregular, transparent masses, of a pale-red, or yellowish colour, and generally abounds with whitish tears, resembling those of BENZOIN. The drug, however, which is commonly sold in the shops, consists of large, light pieces, very impure, from the saw-dust with which the resinous juice is mixed. And, though inferior to the preceding sort, yet in a purified state, it possesses greater fragrance.

Storax is one of the most grateful of the odoriferous gum resins, but is at present disused in medicine; and employed chiefly in fumigations, or as a perfume.

There is another species, known under the name of *Liquid Storax*, which exudes from incisions made in the *Liquid-ambar Styraciflua*, L. [Sweet Gum, or Maple-leaved liquid-amber tree,] a native of Virginia. It is farther obtained, by boiling the bark or branches of that tree; in consequence of which the purer particles rise to the surface. The *genuine liquid storax* is of the

consistence of honey, possessing a fragrant smell, somewhat resembling that of the preceding, solid species. But the drug of this name kept in the shops, is an artificial compound of the concrete storax, common resin, wine, and oil, properly incorporated. Whether genuine or spurious, it is only used externally as a balsamic.

STOVE, in domestic economy, a contrivance, or apparatus, in which fires are made, with the view of conveying heat throughout houses,churches,orotherbuildings.

A Mr. SHARP procured a patent, several years since, for certain improvements, which are calculated to obviate the inconveniences [of FRANKLIN's stoves.] Thus, by adding a funnel to the top, these fire-places can be adapted to any chimnies; and, if the funnel be lengthened, it may be accommodated to libraries, ball-rooms, or other buildings, which have not the advantage of a chimney: Mr. S.'s stove-grates are provided with a hollow base; in consequence of which, he is enabled to apply them, without any additional brick-work, more effectually to the purpose of heating rooms, than is practicable with those on FRANKLIN's construction: at the same time, by his alterations in the *air-box*, a larger portion of air is introduced. Our limits permit us only to add, that Mr. SHARP's stove-grates may be accommodated to every building, whether public or private: and we refer the reader to his "*Account of the Air-Stove-Grates*," &c. 8vo.

In June, 1796, a patent was granted to Mr. WILLIAM WHITTINGTON, for his invention of a *Portable Baking Stove*. The patentee asserts, that the contrivance is calculated for baking all kinds of bread, particularly that prepared of oats, with a cheapness and facility not hitherto experienced. It may be manufactured from any metal, or even from clay, of any size or shape; and either with or without an oven: the door for supplying fuel, together with the pipe or flue for carrying off the smoke, may be fixed in any part of the stove. Besides, this machine may be used in any situation, whether on land or at sea; being easily portable, and requiring only *one-fifth* part of the fuel consumed in the common way; as it may be easily heated with coke, coals, wood, charcoal, or any other substance. For a more diffuse account of such contrivance, the reader will consult the 12th vol. of the *Repertory of Arts*, &c. where it is illustrated with an engraving.

A patent was likewise granted to Mr. EDWARD WALKER, for a portable Stove or Kitchen; to facilitate the processes of cooking, or dressing provisions. The whole is manufactured of either cast or wrought iron; having a fire-place in its centre, which is inclosed by a door: beneath is an ash-hole; and on each side, there is a closet, one of which may be employed for baking; the other will contain two spits, with racks, &c. complete; the top may be used as a *broiling-plate*, heated by the same fire; while the smoke is carried off through an iron funnel, having a smoke-jack for the purpose of turning the spits. A more complete idea of this stove may be obtained from the 15th vol. of the *Repertory*, &c. where the specification is illustrated with an engraving......See also the articles FIRE-PLACE, FURNACE, GRATES, and KITCHEN.

Stoves, in *Horticulture*, are buildings erected for the purpose of preserving tender plants, which would otherwise perish, from the moisture and coldness of our climate.

These erections are usually divided into two classes, namely, *bark* and *dry-stoves*, according to the plan on which they are established. In the former case, a pit is dug to the depth of three or four feet, that generally extends over the whole length of the hot-house, and is filled with fresh tanner's bark, in which the pots, containing the plants, are plunged.......See Hot-bed.

Dry-stoves are built of bricks, in the form of flues, which are conveyed either beneath the pavement, or attached to the back wall of the house; one being constructed above another, and returned six or eight times throughout the whole length of the building. In such stoves, it is necessary to arrange the pots on shelves, rising progressively. Their dimensions ought to be adapted to the number of plants to be preserved; the floor being elevated to a greater or smaller height above the surface of the ground, according to the natural humidity or dryness of the soil. It will be necessary to make paths about two feet wide in the front, for the convenience of walking. The furnace may be placed either in the middle, or at one end of the building; but it should, in every case, be adapted to the nature of the fuel to be employed..... The best for this purpose is *turf*; because it burns more uniformly, and slowly, than any other combustible substance, and consequently requires less attendance.

Such is the manner in which these kinds of stoves are generally constructed; but Dr. Anderson has lately contrived another apparatus, upon a *new* plan, and accommodated to his *Patent Hot-house* (See hot-house.): as, however, a mere description of his peculiar stove would convey an imperfect idea of the invention, we are obliged to refer the curious reader, as well as the lover of horticulture, to the first volume of the new series of Dr. A.'s *Recreations in Agriculture*, &c. where the principle is fully developed, and illustrated with several cuts.

STRAINS, in farriery, denote such accidental injuries as sometimes happen to horses, by a violent or unnatural distention or stretching of their muscles or tendons; in consequence of which, the animals suffer great pain, and are generally lamed.

The treatment of this affection must be regulated according to the situation of the injured parts. Thus, if the *ligaments*, that connect the thigh, or other bones, be *strained*, it will be advisable to turn the horse into a good pasture; as the richness of the food will prevent his health from becoming impaired; and the gentle exercise in the field will preserve the joints from stiffness and rigidity.

Where the *shoulder* has thus been hurt, the horse will not put the strained leg forward in the same manner as that which is sound; and, in trotting, describes a circle with the former, instead of a straight line: the lame leg likewise projects beyond the other. If such strain be accompanied with inflammation, bleeding will become necessary; after which the

part affected must be well bathed three times every day with hot vinegar, or verjuice in which soap has been dissolved. But, in case no swelling appear, the animal ought to rest for two or three days, and the muscles should be rubbed with opodeldoc, or with a mixture of camphorated spirit of wine; and oil of turpentine, in the proportion of two parts of the former to one of the latter.

Poultices, consisting of oatmeal, rye-flour, or bran boiled in vinegar or wine-lees, together with a sufficient portion of hog's-lard, to render them soft, will be of great service, if timely applied; and, when the inflammation subsides, the strained parts may be bathed with either of the liniments before specified, till the perfect use of the limb be restored.

The *pasterns*, and *knees*, are liable to strains, chiefly in consequence of blows, or similar ill usage: if they be much swelled, a poultice may be applied, and the parts treated in the same manner as the *shoulder;* or, they may be bathed with a liquor compounded of one pint of vinegar, four ounces of camphorated spirit of wine, and two drams of white vitriol, previously dissolved in a little water. As these parts are generally subject to great weakness, after violent strains, the horse should be sent to a level pasture, which will greatly promote his recovery.

The last case deserving notice, is that of *strains* in the *hock*..-.. These must be bathed in cooling and corroborant liquids; but, if the ligaments be injured, it will be proper to foment them with woollen cloths, dipped in a hot mixture of verjuice and spirit of wine, to which a small quantity of crude sal ammoniac may be added..... Lastly, if any internal callosities remain, it will be advisable to *fire* the joint carefully with *razes*, or lines set closely together; after which, a mercurial plaster should be applied; but, in case such concretions appear externally, they may be removed by the repeated use of the blistering plaster, the composition of which has been specified under the article BONE-SPAVIN; omitting, however, the sublimate, on account of its corrosive nature.

STRANGLES, a disorder incident to colts and young horses: it becomes evident from a collection of impure humours, that are discharged by the nostrils, or by suppuration from the glands, situated beneath the bones of the lower jaw.

The symptoms, indicating this disease, are, loss of appetite, dullness, and inactivity; a hollow, dry, cough; and, progressively, intense thirst: as its virulence increases, the animal becomes languid; and, in consequence of the painful tumours formed in the jaw-bone, will at length be unable to swallow. The first object of attention, in case the fever continue moderate, and the evacuations be regularly performed, is to examine the swelling, and promote suppuration; which may be effected by cutting off all the hair contiguous to the tumified part, and fomenting it for ten minutes with flannels, dipped in strong and hot decoctions of marsh-mallow, chamomile, or similar emolient vegetables. The following poultice must then be applied, namely: Take coarse bread crumbs; barley meal; and elder-flowers, of each two handfuls; boil them in a sufficient portion of milk; and, while the mixture is hot, add three

oz. of turpentine, and six oz. of hog's-lard. The quantity thus prepared will be sufficient for two or three poultices, which ought to be used moderately warm, and be firmly secured, every night and morning, after repeating the fomentation for five or six days; or till a suppuration be effected. When the discharge ceases, the following ointment, spread on tow, should be applied to the wound, and the poultice laid over it, to promote the healing of the ulcerated part: .....Take of resin, and Burgundy pitch, six oz. each; of hog's-lard, 4 oz.; of honey and common turpentine, two oz. each; and one oz. of yellow wax. These ingredients must be melted together: on removing the mixture, two drams of finely pulverized verdigrease must be gradually incorporated, and the whole frequently stirred, till it become cool.

Should the horse, during the strangles, be seized with considerable fever and inflammation, or the swelling be so situated as to threaten suffocation, it will be advisable to bleed him moderately. The food, throughout the course of the disease, ought to consist of warm mashes, given frequently in small quantities; to which half an ounce of liquorice and aniseed, in powder, may be advantageously added, together with about two ounces of honey. The diseased animal must be kept warm; and, if the weather be favourable, he should take gentle exercise, or undergo the usual discipline of the stable, though in a less compulsory degree.

This malady is seldom productive of dangerous consequences, unless it be neglected. As it mostly terminates with a discharge from the nostrils, these parts should be often cleansed with sponges, dipped in warm water; but, if such evacuation continue to be copious and fetid, after the swellings have suppurated and healed, it may be considered as symptomatical of the GLANDERS; in which case it will be advisable to adopt the treatment already stated under that article.

STRANGURY. See URINE.

STRAW, denotes the stalk on which corn grows, and from which it is separated by threshing.

Straw is an article of extensive utility in rural and domestic economy......When chopped or cut small, by means of the machine known under the name of STRAW-CUTTER (to which we refer), it affords a wholesome provender for horses and oxen, especially if it be mixed with green food. It is likewise usefully employed in thatching cottages, houses, and barns.... But, as such buildings are liable to be uncovered by violent storms, farmers should, if possible, annually save a sufficient quantity of wheat-straw, in order to be provided against accidents: thus, the necessity of purchasing straw at a high price, or of threshing their wheat at an improper season, may be effectually obviated.

In May, 1798, Mr. PETER BOILEAU, obtained a patent for a new and improved method of manufacturing straw into hats, bonnets, &c. but such privilege having been annulled by a Court of Justice, we shall state the plan on which he proceeds.....The straw is first separated at the joint, and deprived of its external skin or covering; one end of each tube being cut in the form of a pen, so that it may be inserted into the cavity of another; afterwhich it is immersed in water,

to render it pliant, and susceptible of the requisite shape on the block. Next, a small circle is to be traced on the surface of a wooden mould (having the form of the crown corresponding with the article to be manufactured); from which, lines are to be drawn perpendicularly, diagonally, or in any other direction. At the top of each line must be fixed a nail or pin, to which a double wire should be fastened: the straw is then plaited between such wires, and the ends are joined by introducing the sharp end of one tube into another, till the crown be completed.

For making the brim of the bonnet or hat, a sheet of thick pasteboard must be formed into the requisite shape; lines or curves, similar to those above described, are next to be drawn, and the wires fastened through small holes made at the top. The straw is worked in the same manner as that for the crown; to which the brim may be attached, either by continuing the work so as to form one piece, or by sowing both together, and concealing the juncture by a wreath of straw, or any other mode, which fancy may suggest.......See also PAPER.

STRAWBERRY, or *Fragaria* [*vesca*] a genus of plants, comprehending three species, two of which are indigenous; but the principal is the *vesca*, or Common Strawberry, growing in woods, hedges, and hollow ways; where its flowers appear in the month of May or June; and are succeeded by small red fruit. The plant is eaten by sheep and goats, but is not relished by cows; and is totally refused by horses and swine.

The common Strawberry is the parent-stock from which all the different varieties have been obtained by culture: the most remarkable of these, are:

1. The *Wood-Strawberry*, with oblong serrated leaves, and small white, round fruit....2. The *Green*, or Pine apple Strawberry, which has received this name from its delicate flavour, resembling that of the PINE-APPLE....3. The *Scarlet*, or *Virginian* Strawberry, which has also oval serrated leaves, and bears a roundish berry, of a deep scarlet colour......4. The *Hautboy*, or *Musk* Strawberry, is a native of America, but has long been raised in British gardens: it is remarkable for its rough spear-shaped leaves, and its large pale red fruit......5. The *Chili* Strawberry has oval, thick hairy leaves, large flowers, and firm berries....6. The *Alpine* Strawberry, has small oval leaves, diminutive flowers, and oblong pointed fruit, of a moderate size....7. The *Monthly*, or Ever-flowering Strawberry, originally a French variety, produces very delicate fruit, generally pointed towards the top, and bulky below; being in season from May to November: the plant itself, however, is very small, has diminutive leaves, and furnishes but few off-sets for transplantation.

All the varieties of this vegetable are hardy, perennial plants, which flower in May and June, producing perfect fruit in June, July, August, and even till November. They may be propagated by planting off-sets, or suckers, in any light, rich garden-soil, where they annually yield abundant crops, if properly weeded, and supplied with moisture. Their fertility, however, will be considerably increased, by transplanting them every second year into fresh beds,

that have previously been dug, or otherwise prepared for their reception.

[A pine-board laid between the beds of Strawberries, prevents the growth of weeds : tan, strewed on the walks, has the same effect.... The Strawberry lives only four years. In making a new bed, care should be taken to avoid putting out any black roots, as all such have lost their vegetative power.]

As the Strawberry is one of the most *exhausting* plants, and requires ample nourishment, all weeds growing in its vicinity should be carefully removed. Hence it will be found, that the earth, in which an old stock has grown, undisturbed for several years, on digging up its roots, in a manner resembles wood-ashes ; because it is deprived of all the soluble parts.

Without entering into a minute account of the culture of this useful plant, we shall briefly remark, 1. That the most proper season for transplanting strawberries, is in the month of August ; when they will have sufficient time to take root before the winter : 2. That it is not advisable either to clip or break off the superfluous shoots, but to wind them around the principal stem, and secure the ends between the stalks ; by which simple method, the plant will be supported in an erect situation, and the fruit be preserved from the ravages of vermin, as well as from being soiled on the ground : 3. To promote the growth of the berries, the contiguous earth around the stocks ought to be covered in the spring with tanners' waste ; or, where this cannot be easily procured, with oyster-shells : thus, all weeds will be effectually suppressed, and an uniform beneficial moisture may be ensured. Lastly, when the first rudiments of the fruit appear, the soil ought to be carefully stirred by the hoe, and then manured with the following composition, that will remarkably contribute to its fertility. Take three parts of old rotten dung, one part of soot, and a similar portion of dry soap-boilers' ashes ; mix them thoroughly, and spread this compost loosely by the hand, so that the newly-moved ground may be superficially covered.

There is another, and more advantageous, method of propagating strawberries by the *seed:* it was originally reccommended by Du Hamel, and has been carried to great perfection by Du Chesne. The seeds, consisting of small oblong, dark red-brown grains,should be collected from the surface of the most perfect, ripe berries, which have almost become dry on the stalk ; and be preserved till the succeeding spring ; when they ought to be uniformly mixed with a little dry mould, and sown in a loose, rich garden soil which is properly worked, and levelled with the rake. Next, it will be useful to sift finely pulverized earth, or rotten dung, over the beds, to the thickness of half-a-crown piece only, and to cover the whole with branches or boughs of fir-trees.... In the course of three weeks, the young plants will appear, when the covering ought to be removed, and the branches set upright along the borders of the beds ; in order to shelter the tender sprouts from the influence of the meridian sun. Others sow the strawberry-seed in August, and protect the young germs with mats suspended over the beds, by means of poles. The plants, thus raised, ought to be

carefully weeded and watered: those reared in the spring, may be transplanted in the autumn of the same year; but, when sown in the latter season, they must remain in the seed-bed till the following summer. This mode of cultivating strawberries possesses many advantages over the usual practice: thus, it will be easy to obtain the most delicate foreign sorts, of which it would otherwise be difficult to procure off-sets; nay, by sowing the seed of degenerated sorts, together with those of superior fruit, many new and excellent varieties will result from such combination.

Du Chesne has made the following curious experiments, on the propagation of strawberries from their seeds: He directed the water in which this fruit had been washed, before it was used at table, to be thrown in a shaded corner of his garden, where the soil had been manured with rotten branches and leaves: in this manner, he obtained very beautiful plants for an extensive piece of ground. On covering the beds, over which such seed had been scattered, with connected pieces of the moss growing on trees, and removing the latter, when the plants had acquired 2 or 3 leaves, he obtained excellent crops. In March, 1764, strawberry-seeds were scattered on patches of moss (*Gateaux de mousse*), in pots placed under the windows of a hot-bed: these afforded the most vigorous plants. For such purpose, he principally employed the *Hypnum triquetrum*, or Triangular Feather-moss, which grows on damp meadows, fields, and hedges: it should, however, be remarked, that Du Chesne, in all his experiments, found it necessary to moisten the earth, or moss, several times every day, till the plants appeared above ground.

Lastly, M. Mallet has likewise (*Bibliotheque Physico-Economique*, for 1798) strongly supported this method of propagating strawberries from the seed; and he observes, that they should be covered with straw, or light branches of trees, and regularly watered two or three times in 24 hours, to ensure a plentiful crop: the covering ought to be removed only after the plants have acquired the *fourth* leaf; and the irrigation should be continued till the latter end of June. He concludes with remarking, that strawberries thus raised, are extremely productive; and, if planted on beds *five feet* wide, are greatly superior to those produced from off-sets, or suckers.

In situations, however, where early strawberries are an object of attention, Dr. Anderson directs them to be planted in pots which may be arranged in flat pans made of milled iron; and these again placed on a wooden frame, sufficiently strong to support their weight. From each corner of such frame, a rope is be passed upwards, over a pully fixed to the rafters of a hot-house, constructed according to his plan, whence the rope may be drawn horizontally to other pullies fixed in a similar manner, and be carried from these over a cylinder turning upon an axis; so that the whole of the frame, together with the pots and pans, may be elevated, or lowered, at pleasure. Thus, the pots may be raised, till they are brought closely under the glass of the ceiling; which, being the warmest part of the building, will cause the plants to vegetate with the greatest luxuriance. He farther observes, that the pots

may be supplied with water, by pouring it into the pans, without lowering them; and, as the berries gradually ripen, they may be gathered, and the frames again suspended.

Strawberries are a wholesome, delicious fruit; and may be eaten alone, with sugar, or with milk, but most agreeably with wine: they have a pleasant sub-acid taste; abound with juice; and possess a fragrant smell. Being of a cooling and laxative nature, they may be considered as medicinal; and LINNÆUS observes that, by his own experience, a copious use of this fruit has proved a certain preventive of the STONE in the kidnies. HOFFMAN states, that consumptive patients have been completely cured by a *liberal* allowance of these berries. Farther, they promote perspiration; impart their peculiar fragrance, together with a violet colour, to the urine: and dissolve tartarous concretions on the teeth. In domestic economy, a palatable jam, wine, and vinegar, are prepared from this fruit.

An infusion of the strawberry-leaves, while young and tender, makes excellent *tea*; but, for such purpose, they ought to be dried in the *shade*: being slightly bitterish and styptic, they have been used with advantage in laxity and debility of the intestines; in immoderate secretions, or suppressions of the natural evacuations, as likewise in hemorrhages and other fluxes. Lastly, they are of considerable service as aperients, in suppressions of urine; visceral obstructions; the jaundice, and many other complaints.

STRAWBERRY-TREE, or *Arbutus*, L. a genus of shrubs, consisting of nine species, three of which are indigenous: namely,

1. The *Unedo*, or COMMON STRAWBERRY-TREE, which grows on barren lime-stone rocks, particularly in the western parts of Ireland, where it flowers in September. This species is a principal ornament of our shrubberies, on account of its beautiful foilage, and its fine yellow flowers in autumn, which produce berries in the succeeding year, so that blossoms and fruit appear at the same time: the latter, however, is not greatful to the taste, even though mellowed by frost. Nevertheless, it is eaten by the lower classes of people, who are accustomed to drink water, after partaking of such repast. The Common Strawberry-tree may be propagated by cuttings, by layers, or by seed. These should be set early in March, in pots of light rich earth, and afterwards put in a hot-bed: in the course of five or six weeks they will strike firm root in the mould, when they ought to be gradually inured to the air..... During frosty weather, it will be advisable to shelter them, and occasionally to expose them to the open air, in mild weather. After two or three years, the young plants may be removed to the place of their destination; for they will have become so hardy as to resist the severest winters, in any soil or situation.

2. The *Alpina*, MOUNTAIN STRAWBERRY-TREE, or BLACK-BERRIED ALPINE ARBUTUS, thrives on dry mountains in Scotland, and the Western Isles, where its flowers appear in May, and are succeeded by round, black berries.... This species is refused by goats; its fruit possesses a flavour slightly

resembling that of black currants; to which, however, it is greatly inferior. Its branches and evergreen leaves have been advantageously employed in *tanning*.

3. The *Uva ursi*, BEAR-BERRIES, BEAR WHORTLE-BERRIES, or, BEAR-BERRY STRAWBERRY-TREE, grows on dry heaths, and woods, chiefly in the Highlands of Scotland; and flowers in the month of May or June. This plant is refused by horses, cows, goats, and sheep. Its leaves have an astringent bitterish taste, and are generally used in Sweden, and Russia, for tanning leather; and in combination with iron or its preparations, for striking a *black* colour.... When dried and pulverized, they have been advantageously given in doses of from [five to ten grains,] repeated two or three times every day, in calculous and nephritic complaints.

The berries of both the last-mentioned species of the Strawberry-tree, have been recommended by LINNÆUS, as useful substitutes for grain, in the process of making *bread*: on account of their bitter taste, however, they ought to be bruised, macerated in different cold waters, and then baked or dried in an oven, before they are fit to be mixed with any other flour. But, even in this improved state, we conceive, they would reward the trouble of the housewife, only in times of great scarcity.

[This is a low evergreen shrub, trailing on the ground, found in dry, sandy soils, in woods, and on mountains in many parts of this continent. HEARNE observed it as far north as lat. 71, and speaks of it, under the Indian name of *Jackasheypuch*. It grows abundantly in New-York and New-Jersey.

By the experiments of Dr. J. S. MITCHELL related in his *Inaugural Dissertation*, *Philadelphia*, 1803, it appears that the leaves of the plant are more astringent than the stalks, which is contrary to Prof. MURRAY's opinion. Beside the utility of this plant in nephritic and calculous cases as mentioned above, the *uva ursi* has been found highly beneficial in the following complaints.

1. Old gonorrhœas, and gleets.

2. In cases accompanied with the common symptoms of the stone in the bladder.

3. The late ingenious Mr. GEO. LEE of the Pennsylvania Hospital, cured a stricture of the urethra, after bougies and other remedies had been used without effect, by giving the patient 15 grains of *uva ursi* three times a day. An infusion of the plant in water, is the common mode of exhibition; two ounces, three, four or five times a day, may be taken.]

STRAW-CUTTER, or CHAFF-CUTTER, as it is commonly termed, denotes a machine for the purpose of cutting straw, with a view to feed horses and cattle to greater advantage.

In the year 1797, the *Society for the Encouragement of Arts*, &c. conferred a reward of 30 guineas on Mr. ROBERT SALMON, for his improved machine for cutting straw.

[Dr. WILLICH gives a plate and description of Mr. SALMON's straw cutter, which is certainly a powerful machine, but too costly for the United States. It has been thought better to substitute the plate of one which can be procured at Wright's, Cherry-street, in Philadelphia, the power of which the editor can speak of from experi-

ence....See the Plate facing page 49.

A The box in which the straw is placed.

B B The wheel in which the knives are fixed.

C C The knives.

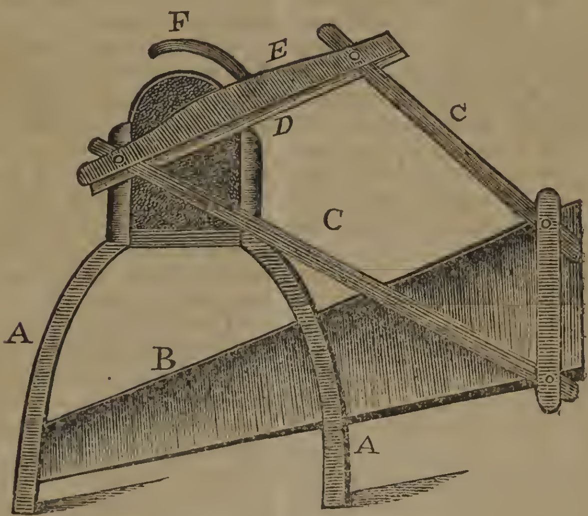
D D D D The frame of the machine.

E The handle that turns the wheel.

F The endless screw that turns the wheel G, and the roller H..... This roller is of wood, bound with a tin plate, punched with numerous holes, which draws the straw forward at I.

Straw-cutters on the above plan are sold at $40.

The following cut represents a more simple and cheap straw-cutter, invented by Mr. MOSES COATS, near Downing's-town, Pennsylvania, and is now in general use in the counties of Chester, Lancaster and York.



A A The front legs on which the box stands.

B A board passing through the legs.

C C Two tongues or laths which work on screw pins, and conduct the knife in its proper course through the straw.

D The knife.

E A board longitudinal to the knife; the lathes C C pass between them.

The knife is concave next the straw, to throw the edge against it, and it is furnished with a board above the straw, and treadle to press the straw tight, and a rake to push it forward in the same manner as the old Dutch straw boxes.]

In February, 1801, Mr. WILLIAM LESHER, of Hardingstone, Northampton, obtained a privilege for his ingenious contrivance of cutting straw, hay, tobacco, &c. by an engine, to which we have

alluded under the article HAY; but, not having been able to procure a satisfactory account of his patent, we shall only remark, that the best proof of its merit, is the general adoption, which we understand it has experienced in Northampton and its vicinity.]

STUCCO. See CEMENT.

STURGEON, or *Accipenser Sturio*, L. a fish, which is sometimes taken in the British rivers; being, however, generally imported from Russia, or the Baltic sea, as well as from North America; it is principally caught in the rivers Volga, Danube, and Vistula.

This fish grows to a prodigious size, frequently 18 feet in length, and weighing from 7 to 800lbs. Its flesh is very delicate, firm, and white, resembling veal, on which account it is greatly esteemed when roasted: it is, however, generally sold in a pickled state. The sounds of sturgeon afford the fish-glue known under the name of ISINGLASS; and, their roes, when properly dried and salted, are converted into CAVIAR, to which article the reader is referred, for an account of its properties.

STYPTIC, a term applied to medicines, which serve to stop hemorrhages, or effusions of blood.

Various vegetables may be advantageously employed as *external styptics*, such as the AGARIC, PUFF-BALL, &c.; but there are certain preparations of greater efficacy, the principal of which is the *compound powder of alum*. It consists of one ounce and a half of alum, and three drams of gum kino, which are finely pulverized, and incorporated.....One of the most successful styptics, however, is prepared by mixing one part of the caustic volatile alkali, with three parts of water: if this fluid be applied to a fresh wound, it effectually checks the flowing of blood, both from large and small vessels.

Prof. STARK, of Jena, recommends the following styptic powder; which, according to his experience, has proved uncommonly efficacious in suppressing profuse *uterine* hemorrhages, namely: Peruvian bark, two drams; cinnamon, one dram; blood-stone *(lapsis haematites)* half a dram; and loaf-sugar, two drams: let these ingredients be reduced to a fine powder; a tea-spoonful of which is to be taken every hour, or oftener, in chamomile or balm tea. We have no doubt of its good effects.

SUBLIMATE, a chemical preparation, consisting of MERCURY combined with the marine acid. Being extremely corrosive, and the manufacturing of this drug being attended with great danger to health, it is generally imported from Venice and Holland.

Solutions of corrosive sublimate, in the proportion of one dram to a quart of water, are chiefly employed for consuming *proud* flesh, and cleansing foul ulcers. A much weaker solution is sometimes used by the gay, as a cosmetic for removing cutaneous eruptions. In a dry state, mixed with flour, honey, &c. the sublimate forms a powerful composition for destroying rats, mice, or other vermin; but, on account of its deleterious properties, the greatest caution is requisite, particularly in places to which children have access: for, as they are accustomed to *taste* every thing, such mistake might be productive of fatal consequences. In case, however, any portion of this poison should have been accidentally swal-

lowed, no time should be lost in resorting to the remedies already pointed out, in vol. i. p. 80.

SUCCORY, or *Cichorium*, L. a genus of three plants, the following of which are the principal; namely:

1. The *Intybus*, WILD CICHORY, or SUCCORY.....[See vol. ii. p. 116.]

2. The *Endivia*, or ENDIVE, is an exotic annual species, which is generally reared in our gardens, as an ingredient in winter salads. It is propagated by scattering the seeds in spots of open ground, at intervals, from the beginning of June to the end of July; in order to obtain a supply for the table. The young plants must be removed into beds or borders, that have previously been well prepared by the spade: and, as the chief excellence of endive consists in the whiteness of its inner leaves, it will be adviseable, either to cover them with flower-pots, or to tie them loosely together, when nearly full grown, so as to exclude them from the sun, for two or three weeks; in consequence of which, they will become perfectly blanched. In the winter, they are either covered with straw, and mats; or preserved in fresh sand, in a dry cellar. In its properties, this plant is not essentially different from the preceding species.

SUFFOCATION, denotes a suspension of the most important vital function, namely, that of respiring or breathing; without which animal life cannot be supported.

This dangerous casualty may arise from various causes, such as the want of air to a person immersed under water; or the irruption of that fluid into the chest; in which case it is termed DROWNING (see that article). It is also occasioned by too great a determination of blood to the lungs, as in quinsies, suffocative catarrhs, &c.

Another cause of suffocation, is the introduction of any substances into the windpipe, or the swallowing of such foreign matters as remain fixed in the gullet; and by compression prevent the access of air to the lungs; in which cases, a total cessation of breathing may be apprehended. To obviate this fatal accident, gentle percussion of the shoulders and back will be advisable: the steam of milk, or water, should be inhaled, and the throat be tickled with a feather dipped in oil. Farther, the patient ought to take copious draughts of water-gruel, milk, oil of almonds, or any other lubricating fluid; and, if the bodies adhering to the throat be *blunt*, they may be thrust down by means of a long wax taper, which has been previously rendered pliable by warmth, and also immersed in oil: or, if this cannot be speedily procured, a piece of sponge may be fastened to a wire, which should be covered with leather, then oiled, and employed for a similar purpose.....See also GULLET, and METALLIC *pointed substances*.

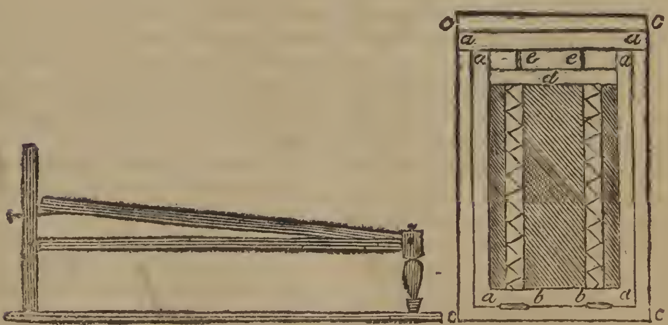
The vapour arising from boiling wines or strong liquors, when inhaled, tends to impede the circulation of the blood, and sometimes even produce *suffocation*. Similar consequences may ensue from inspiring the fumes of sulphur, antimony, and a variety of other mineral and vegetable substances, particularly of CHARCOAL.

First symptoms of suffocation..... Giddiness; head-ach; lethargy; fainting; convulsions; and general torpor.

External appearance of persons suffocated by the deleterious fumes arising from charcoal; various metals, such as copper, lead, antimony, and mercury; the vapours from fermented liquors, moist wood, flax, and turf; as well as in consequence of respiring or sleeping in unventilated apartments, caverns, and mines :....The head, face, and neck are swoln; the eyes are propelled from their sockets; the tongue is protruded at one side of the mouth; the jaws are firmly closed; the face is of a livid, and the lips are of a deep-blue colour; the abdomen is inflated; the body is insensible to pain, and appears to be in a profound sleep.

Immediately on discovering a person in such unfortunate situation, the windows and doors ought to be opened; the body undressed, removed to the open air, and supported in a leaning posture on a chair. Next, the patient must be covered with flannel or blankets, the face be sprinkled with vinegar, and the pit of the stomach with cold water; and, if it be convenient, the whole body, or at least the legs, should be plunged into a cold bath. After each application of vinegar or water, the skin ought to be rubbed with flannel or a soft brush; then leaving the person, thus situated, for a few minutes in an undisturbed state. Farther, clysters consisting of vinegar and water, will be useful; and, on the return of life, an inclination to vomit must be promoted by a feather dipped in oil, while gentle friction is to be continued, at intervals. The first symptoms indicating this happy change, will be, foaming at the mouth, and shivering of the whole body, especially after affusions of cold water.

In some cases of suffocations, however, it will be advisable to employ the united powers of electricity; blood-letting; *bronchotomy*, or the opening the wind-pipe by an incision; or the earth-bath; or the artificial introduction of air into the lungs, by means of a pair of bellows described vol. ii. pp. 392. If these effects prove successful, so that the patient is again able to swallow, the most proper drink will be vinegar and water, or infusions of mint and balm.



[*Nocturnal Suffocation.* Dr. TRUSSLER of Bath, in a letter to Dr. HAWES, says, he was many years in danger of suffocation from a phthysicky cough, that is apt to seize persons who lie with their heads too low. To prevent such an accident to himself, he had his bedstead made to rise as high or low at the head, as he found necessary. The preceding cut is a sketch of it. He had an inner frame made to his bedstead, which can be raised by two iron pins put through holes in the back parts of the bed, on which the inner frame rests; thus he raises it to any height he pleases.

a a a a a a Inner frame of the bedstead,

b b Handles to raise it by.

c c c c Outer frame of the bedstead.

d Head rail to stretch the lacing.

e e Iron pins to raise the inner frame.

But the bed may be raised, without any alteration in the bedstead, by a straw matrass, made in the form of a wedge. By sleeping on this inclined plane, he has not, for many months, been seized with the cough. Neither has he suffered from the cramp in his legs, to which he was formerly subject. When this cramp comes on, stretching out the limb, or rising out of bed, affords immediate relief. See *Report of the London Humane Society for* 1802.]

SUFFOLK-GRASS. See Annual MEADOW-GRASS.

SUGAR, a sweet concrete juice, obtained from the Sugar-cane, or *Saccharum officinarum*, L. a species of reed or cane, which grows in the East and West Indies. According to modern chemists, however, it is a true essential salt, capable of chrystallization; and which is contained, in a greater or less proportion, in all vegetables of a sweet taste, but most abundantly in the plant above mentioned.

It grows to the height of from $3\frac{1}{2}$ to 7, and sometimes to 12 feet, in strong deep lands. When ripe, it assumes a fine straw-colour; and is usually cut at the age of 12 or 15 months, according to the season, or the nature of the soil.

The canes are divided into pieces about a yard in length; tied up in bundles; and conveyed to a mill; where they are expressed between three upright wooden rollers covered with iron. The saccharine juice is conducted into a *receiver;* and, being apt speedily to ferment, it becomes necessary to separate the sugar as soon as possible. This object is effected by clarifying it in a boiler, over a fire, with a small portion of pulverized quick-lime; after which it is evaporated in a cauldron, till it acquires a due degree of consistence; when it is poured into *coolers.* As the inspissated fluid becomes cool, the sugar spontaneously shoots into irregular crystals, separated from the *mother-water.* Next, the granulated matter is conveyed to the *curing-house*, where the treacle is completely drained; in which dry state, the former is called *raw*, or *muscovado* sugar: thus it is sent to Europe, where it is subsequently refined.

The most perfect purification, or *refining of sugar*, is performed in the following manner: The raw powder is again boiled in proper kettles, with lime-water, and bullocks blood (that has been previously strained, and deprived of its excrementitious parts); when it is

boiled down to a proper consistence. It is then laded into vessels to cool, being continually stirred, to prevent it from shooting into large crystals: when perfectly cold, it is poured into unglazed clay moulds, of a conical form, and suffered to coagulate. Farther, with a view to carry off any particles of syrup that may still remain in the refined mass, the lower points of the moulds are open, and covered to the thickness of several inches with clay previously softened in water, and which is occasionally moistened. In this manner, the sugar at length acquires the requisite degree of whiteness and fineness; in which state it is denominated *loaf* or *lump* sugar; and after being dried in heated rooms, it is ready for use.

In August, 1784, a patent was granted to Robert Murray, Esq. for his discovery of a method of refining sugar, and making it from the cane-juice. As, however, his processes are too minute, to admit of being detailed in this work, the reader will consult the 4th volume of the *Repertory of Arts*, &c.

A patent was also granted in June, 1801, to Thomas Wakefield, Esq. for a new method of refining sugar. It consists simply in placing the raw, or muscovado sugar, in any porous vessel; when it is to be subjected to a weight, acting by rollers, by a screw, or by a wedge, "with the help of a steam engine," the action of a mill, or any other means of applying force. Thus, part of the colouring matter, as well as other impurities, will be thrust out; and, from the moisture expressed, sugar, molasses, or rum may be obtained, by the usual processes. The pressure may be repeated, according to circumstances, and the relative purity of the sugar; after which it may be refined by the methods usually practised.

Sugar having become an article of almost indispensable use to every person in *civilized* life, various attempts have been made, with a view to procure it from other vegetables; and particularly from the following, namely:

1. The White Beet; the saccharine properties of which were discovered upwards of 50 years since, by M. Margraaff; and his process having been improved by M. Achard of Berlin, we shall state the method of preparing sugar adopted by the latter. The fresh beet-roots are first washed, and submitted to the action of a mill, which reduces them to a pulp: next, their juice is extracted by means of a press, and boiled over a gentle fire, till it is converted into a thin syrup. It must now be carefully separated from the mucilage, adhering to the bottom of the cauldron, or kettle; then strained, and boiled, a second time, till it acquires a proper consistence for crystallization; a point which can only be ascertained by experience. The syrup is afterwards poured into tin vessels, from two to three inches deep, that the grain may crystallize: these vessels are directed to be placed on frames, in a room heated by a stove to a considerable, but uniform temperature; and, in the course of two or three weeks, the sugar will be separated in the form of small crystalline grains. The whole is then poured into linen bags; in which, on compression, the sugar remains, while the strained liquor, is received into vessels; and, after undergoing si-

milar processes, it will yield an additional quantity of saccharine matter.....By this management, 20lbs. of roots produce, upon an average, one pound of sugar; and, to such perfection has it been carried, that M. ACHARD is enabled to sell the sugar at 3d. per pound. ....As we cannot enter into farther detail respecting the culture, preparation, &c. of the Beet-root, we must refer those readers, who wish for more minute information, to Mr. A.'s "*Circumstantial Account*;" of which a translation appeared in Mr. NICHOLSON'S *Journal* for September, 1799. [See vol. 1. p. 259.]

2. The Sugar-MAPLE, of which we have given an account in vol. 4. p. 38. There are various other plants which afford sugar, particularly parsnep-roots, skirrets, carrots, and Indian-corn: the latest experiments that have been made with these vegetables, are those of M. HERMBSTAEDT, whose memoir is also translated in Mr. NICHOLSON'S *Journal*, vol. iii. for October, 1799.

With a view to diminish the use of sugar, or at least to afford a substitute for that article, M. M. MARGRAAFF and LOWITZ recommended two different processes for purifying honey, so as to anwer the common purposes of a *sweetener*; but their expedients being too expensive, Father GIOVANE BATISTA DA ST. MARINE, an ingenious Venetian Monk, has proposed the following method: To three parts (by weight) of honey, eight of water must be added; together with one part of charcoal, broken to pieces, but *not reduced to powder*. This mixture should boil for one hour, when it ought to be filtered; and, after being thus purified, it is to be evaporated over a slow fire, till it acquire the consistence of a thick syrup, which will be as palatable as sugar. This process is cheap, and easy; but we question the advantage of converting honey into a saccharine substance; as the former may, in this country at least, be purchased at a lower price.

SUGAR-CANDY, is the essential part of the saccharine matter formed into large crystals, by slowly evaporating the clarified syrup. The whole process is managed in strongly-heated chambers, by the aid of vessels containing numerous threads that intersect each other; and which are fastened to the sides, in various directions. The sugar, thus treated, shoots into crystals around the threads; and, according to its relative purity, the latter acquire a brown, yellow, or white colour. Sugar-candy is chiefly used in a pounded state, for sweetening coffee, and by persons labouring under hoarseness and coughs; the violence of which it contributes to relieve, by lubricating the membranes, and promoting expectoration. Brown Sugar-candy pays, on importation, the sum of 3*l*. 6*d*. per cwt.; and the white sort is subject to the charge of 4*l*. 10*s*. 9*d*. per cwt.

[The following directions on the mode of manufacturing *maple-sugar*, were published in a pamphlet, by a patriotic society in Philadelphia, in 1790. It is observed in the preface, that four men may turn out in common seasons, which last from four to six weeks, 40 hundred weight of good sugar! The following calculation of utensils, &c. is made for four men:

For an excellent account of the sugar maple-tree, the reader is referred to Dr. RUSH's paper in the 3d volume of *Transactions of the American Philosophical Society.*

Detail and Description of the necessary Utensils and Materials.

Kettles.....Sixteen, of about fifteen gallons each.

Iron Ladles....Two, the bowls to contain three or four quarts, each, for shifting the syrup: the handles to have sockets, which may be extended with wood to any convenient length.

Trammels or Pot-Racks.....Sixteen, one for each kettle, the flat part, eighteen inches long; and the round or lower piece, the same; so as to lengthen to about three feet, occasionally.

Screw Augurs....Four, of an half, three quarters, and one inch, for boring the trees. Chopping notches into the tree from year to year, should be forborne; an augur hole answers the purpose of drawing off the sap, equally well, and is no injury to the tree.

Buckets....Eight or ten, of three gallons each, at least, for collecting the sap.

Boards.....Eight or ten, round pieces, to lay on the surface of the sap, at the top of the buckets, to prevent its splashing over.

Coolers....Three or four tubs, of about fifteen gallons each (kettles will answer the purpose) to receive the syrup from the boilers, when, upon trial from the proof stick, it draws into a thread between the thumb and finger, as hereafter described.

Yokes.....Four, to go across the shoulders of the persons employed in collecting the sap, having a bucket suspended at each end.

Troughs...Eight hundred should be made of white pine, white ash, water ash, aspen, linden or bass-wood, poplar, common-maple or sugar-maple:....*avoid for this use, the butter-nut, [juglans alba (oblonga.)] chesnut and oak*;....these would either discolour the sap, or give it an improper taste....A person acquainted with this business, can cut down the timber proper for the purpose, and hollow out about twenty of these troughs in a day; they generally hold from two to three gallons: the largest should be placed to receive the sap of those trees that are most thriving, and which yield the greatest quantity.....It may also be noted, that white-ash and white-pine will make the troughs when green; the other kinds of timber, above-mentioned, should be seasoned, or they will be liable to leak.

Store Troughs.....Where large cisterns, fit for the purpose, cannot be had, which will generally be the case in a new country, troughs may be made of the white-pine, by felling a large tree of that kind, and fixing it in a level position; the upper side to be dug out in the shape of a manger for feeding cattle:....the larger it can be made for receiving the green sap, the better. White-ash and linden or bass-wood, will also answer the purpose; should any of them split and leak, they may be caulked tight......These troughs should be at a convenient distance from the boilers, in a cool place, and under cover, to prevent snow, rain, &c. mixing with the sap....A linen strainer should be so fixed that the sap, when collected in buckets,

may pass through such strainer into these troughs, at one end; and, at the other end, room should be left to dip out for feeding the boilers.

Sheds, Walls, &c....The exposed manner in which sugar has been usually made, in the back country, is attended with many inconveniences, especially in windy weather, when the ashes, leaves, &c. may be blown into the boilers, and thereby discolour the syrup, or injure its flavour; neither can the keeping up a proper degree of heat be always effected in an exposed situation. To remedy these inconveniences it is recommended that a back wall, for the fire-place, be erected, eighteen or twenty inches high, and to extend a sufficient length for all the boilers employed. This wall may be made of stones laid in clay or loam, where lime-mortar is not readily to be had. For saving the ashes, and the greater convenience in making and continuing a regular fire, under the boilers, a hearth of flat stone, about three feet wide, should be made to extend an equal length with the back wall. And further to obviate the bad effects, which too open an exposure is subject to, (it being observed where a number of boilers are placed in a range, those at, and near, the outer ends, do not succeed so well as the more central ones) it is strongly recommended that sheds be erected, to extend over and cover the whole length of the hearth; and so formed that the smoke may pass off, and be at the same time a shelter from high winds, rain, snow, &c. For graining the syrup, after it is brought to a proper state in the boilers, it will be right to have a separate shed or building, in which two of the sixteen kettles should be fixed; for this service, charcoal is much better than wood, as the heat or flame should be confined to the bottoms of the kettles; and be uniform and regular, to guard against burning or scorching. A wall, as above described, should be made at the back of the fire-place, as well as at each end; and the hearth or bottom laid with flat stones, on which charcoal is to be placed.

Andirons.....Pieces of cast-iron, something like andirons, and to serve the same purpose, will be very useful: they should, in the long part, be two feet and an half, and two inches square; the turn at the inner end, four inches downwards, and a small turn upwards, at the outer end, of about two inches, to prevent the wood from rolling. Of these, there should be a number to suit the extent of the fire-place, to be placed at the distance of five or six feet from each other.

Sugar-Moulds.....These should be made of seasoned boards, or of such wood as will not impart a taste to the sugar, and somewhat resembling a mill-hopper, about twenty-seven inches long, and ten or twelve inches wide, at the top, and tapered to the width of one inch, at the lower end.

Frames, to place the moulds in, above described, should be formed so as to admit the moulds to rest in them, about half their depth.

Gutters, spouts, or narrow troughs, should be fixed within the frames, under the moulds, in a descending position; the lower ends to enter covered casks or vessels, so that when the plugs or stoppers are drawn from the bottom

of the moulds, which may be done, in about twenty-four hours after they are set, the molasses that will run therefrom, may fall into these gutters, and pass readily into the *covered* vessels, which, if open, would be exposed to dust and dirt.

Prickers....So termed by the sugar-bakers, about twelve inches long and a half an inch diameter, at one end, and the other, brought to a point; for want of iron, they may be made of hard wood:....a few hours after the moulds are unstopped, the prickers should be run up the bottom of them, three or four inches, to make way for the whole quantity of molasses to pass off.

Process or mode of manufacturing the Sap of Maple, which by further Experience and close Observation may, probably, hereafter, admit of considerable Improvement.

Seasons for Tapping....By trials, made in the month of February, it will readily be discovered, when this valuable tree ought to be bored, for the purpose of extracting the sap, as in that month, either earlier or later, according to the season, it generally begins to yield a sufficient quantity for commencing the business.

Tapping or Boring....Four hundred trees, each bored with two holes, as nearly as may be on the south side; and also with two holes on the north side of the tree, in the early part of the season, with screw augurs from two to four quarters of an inch, according to the size of the tree; and toward the middle of the season, a like number of trees to be bored in the same manner, is recommended, as a better mode for the management of four hands, than if the whole number of eight hundred trees were tapped at the first running of the sap. The sap of the second parcel tapped, will be found richer, and more productive, than if a part had been extracted earlier. The augur should enter the tree, at first, not more than three quarters of an inch: the holes may, at several times, be deepened to the extent of two inches and an half, as the manner of the sap's running may render necessary.... The hole should be made slanting or descending, so that the sap may run freely in frosty weather, and not, by a slow motion, be liable to freeze in the mouth of the orifice. In these holes, spouts should be fixed, to project from the tree, from eight to twelve inches, and not to enter the tree more than about half an inch; as the farther they enter, the more the running of the sap is obstructed: they should be prepared, in readiness for the season, of elder or sumach.

Preserving the Sap...In the early part of the season, the sap will keep two or three days without injury; but as the spring advances, it will be necessary to boil the sap the day after it is collected, or it may ferment and sour.

Lime....To every half barrel, or fifteen gallon kettle, a table spoonful of slacked lime, should be put in, while the sap is warming, and before it boils; this promotes the rising of the scum and forming of the grain.

Boiling....A smart fire should be kept up, while the sap is boiling. As the scum rises, be careful to skim it off. When the liquor is

reduced one half in quantity, lade the second kettle from the end, into the end one; and when the contents of three or four kettles can be contained in one, let the whole be laded into that, at the end; filling up the empty kettles, without delay, with fresh sap. As the liquor in the end kettle, removed from those which have been mentioned, becomes a syrup, it should be strained through a good blanket or woollen cloth; and care must be taken not to suffer it to boil so long, as to be too thick to be strained in this manner. It should, when thus cleansed from its impurities, stand in buckets or other suitable vessels twelve hours or more, that the particles of lime and other remaining sediment may settle to the bottom; after which, it should be so gently poured off into a kettle or boiler, as not to carry with it any of these settlings. However, they need not be wholly lost; they will mostly contain a considerable quantity of sugar or syrup: by pouring fresh sap on them, stirring them well together, and suffering them to stand a while to settle; a great part of the valuable sweets contained in such sediment may be saved. It may be further noted, that when the sap is weak, which is generally the case towards the latter part of the season, it requires more boiling and a higher proof than that collected earlier and of greater strength.

N. B. The method above described was [actually] pursued in the last year, and appeared to answer well; it is nevertheless believed, by a judicious sugar-boiler, that it would be best to avoid letting the syrup stand twelve hours after being strained through a blanket: when the process is begun, the sooner it is completed, in his opinion, the better: the design of its so standing for twelve hours, being chiefly intended to give sufficient time for the particles of lime and other sediment to collect at the bottom of the kettle. It is proposed that lime should be mixed with a quantity of fresh sap in the evening, and be well stirred; the large particles of lime in this case, will be likely to subside before morning, and the clear sap so impregnated may be mixed, the next morning, in proper proportions, in the several kettles; observing, however, that in this mode, more lime will be necessary, as less of its strength will be extracted by cold than by hot-water.

Graining.....The syrup having stood twelve hours or upwards, is then to be gently poured into a kettle or boiler, as above-mentioned; which would be best placed over a fire made of charcoal as before hinted; unless the kettle is so fixed in a furnace or in such a situation, that the flame can be confined to the bottom; for if it be suffered to pass on the sides, it endangers the syrup's being burned. This operation should also be performed with a smart fire, to be uniformly and equally kept up, in which, as well as in boiling the green sap, the use of butter, hog's-lard, and other fat, is not only very useful and advantageous, but absolutely necessary. When, in the course of boiling, the sap rises towards the top, a piece of fat equal in size to a small nutmeg, thrown in, will keep it down. Particular care should be taken to prevent, by these means, the rising of the syrup when graining, which may

require a larger proportion of butter, &c. It is found that the evaporation is much more expeditious, and it is believed that the quantity of sugar made is larger, when a careful guard is kept up to prevent the sap, and particularly the syrup, when graining, from rising; by the timely introduction of a piece of fat as above described.... To form a judgment *when* the syrup is sufficiently boiled, take out with quickness the stirring-stick, which is constantly kept in the boiler for the purpose of taking the proof, rub some of the syrup off the lower end of it with the thumb, and if on applying the finger thereto it draws into a thread, it may be deemed in a proper state to be laded into a tub or cooler. Then it should be forthwith stirred, and that incessantly, with a *stirring-stick* about three inches broad, until the grain can be felt between the finger and thumb, when it is in a fit state to be poured into the moulds. The managing a sugar-works in the West-Indies, and in the refining houses in North-America, has been found to require much judgment and experience to conduct the business to the best advantage; indeed, it seems hardly possible, to communicate to persons who have little knowledge of the matter, and in terms clearly to be understood, full information as to the different appearances of the syrup in the time of boiling, and to point out the *moment* when some material movements or changes ought to be made; nevertheless, from the foregoing hints and directions, which are grounded on observation and experience, it is hoped much may be derived, and that from year to year, greater advances and improvements may be made in this valuable business.

Claying or Whitening the Sugar.... To promote the molasses passing more freely from the sugar, when draining in the moulds, and to improve its colour in two or three days after the moulds are unstopped at the lower end, mix white clay with water so as to reduce it to a thin mortar; with this cover the top of the moulds one inch and a half thick, when this covering appears dry, remove it, and supply the place with a fresh covering of about two inches thick.

Although it is apprehended the use of clay as above set forth, particularly in the latter part of the season will be found beneficial, it may however be prudent to continue or decline the practice, according to the effect or use it appears to be of on a careful trial: the quantity of clay must be proportioned to the manner in which the sugar has been boiled; if high boiled it will require much more clay than if boiled low. It is also thought the use of clay lessens the quantity of sugar, perhaps one fifth part, and may be more or less, according to the knowledge of the person who undertakes the business. It may be further remarked, that if the quantity of sugar be lessened in weight by claying, *one fifth part*, it is not to be concluded that the whole of this fifth part will be eventually lost; there will be more syrup than there otherwise would have been, independent of the water from the clay that passes through the sugar.

Molasses and Vinegar.....When the trees of the second tapping become poor in quantity and quality, which may be about the tenth of

April, or perhaps sooner; then the number of fresh tapped trees will yield a sap, of which may be made good molasses, and also excellent vinegar.

In all sugar plantations it will be advantageous to cut out the different sorts of timber which grow intermixed with the sugar-maple, and even those of that species which are not thriving, promising trees. The timber so cut out will serve for fuel for the boilers, and leave greater openings for the rays of the sun to enter, which will have a tendency to improve and enrich the remaining trees. The ground so cleared of all except the maple-tree, it has been observed, is particularly favourable for pasture and the growth of grass..... "Whether this tree is injured or impoverished by repeated tappings," is an enquiry to be expected, and has been frequently made of late, by persons who have anxiously wished for the success of this business. It has been before observed, that it will bear much hardship and abuse, and it may be added, that there are instances, particularly among the old settlements on the North River, of trees which have been tapped for fifty years or upwards, and continue to yield their sap in the season, equal to any brought into use of later time; indeed, it is asserted with confidence, by persons who have had some years experience, that these trees by use, become more valuable, yielding a sap of a richer quality. How far a careful cultivation of them, the stirring and manuring the soil in which they stand, may improve their value, remains to be ascertained in future, though it may be expected, that this, like almost all other trees and plants, may from a natural state be greatly and essentially improved by the hand of art. Experiments, therefore, will not be unworthy the attention of those citizens, situated in the more interior parts of the States, if it shall, thereby be found that these trees can be readily propagated, either from the seed or young plants, and be bro't to thrive so as to be equal in their product, if not superior to those which have been strewed over the country without the aid of man. To what an extent of cultivation may not this lead! There will be no risk or disadvantage attending the experiment; and it certainly deserves encouragement.]

SUICIDE, is a term expressing either the crime of self-murder; or it is applied to the person committing such unnatural deed.

It is remarkable, that this violation of divine and human law, has prevailed chiefly among the *most civilized* nations; and that it occurs more frequently among the wealthy, than the indigent classes of society. A combination of circumstances generally co-operates, to induce an unsettled mind to commit such unjustifiable crime, thus, it has been urged, that the copious use of *tea*, *animal food*, *spirituous liquors*, and the sulphureous exhalations of pit-coal, in a *variable* climate, instigate to suicide; because they uniformly tend to depress and enervate the human constitution. It would exceed our limits, to refute the absurdity of such notions; and, though the perpetration of this rash act may sometimes originate from insanity, yet we may confidently maintain, that it is most frequently the result of a defective education furnishing no fixed

moral principles, and consequently laying the foundation of vicious habits; such as gaming, and dissipation followed by disappointed ambition, or the desire of avoiding public disgrace; than the consequence of *ennui*, or a weary life.

Those of our readers who wish to investigate this interesting theme, will derive information and amusement from the perusal of Mr. MOORE's *Full Inquiry into the Subject of Suicide* (2 vols. 4to. 1*l.* 11*s.* 6*d.* boards, Rivington, 1790), in which its effects are fully considered, and illustrated by numerous historical examples.

SULPHUR, or BRIMSTONE, a hard inflammable mineral, of a yellow colour: it is insoluble in water; destitute of smell, except by friction, or when heated; and possesses a peculiar, faint taste... This simple substance is found, in a native state, in various parts of the world, particularly in the vicinity of volcanoes, being often combined with other minerals: it is generally cast into *rolls*, for sale, being known under the name of *roll-brimstone*.

Sulphur, when gently heated, rises in vapours, which are easily kindled; and, if it be suffered to cool gradually, it shoots into crystals resembling thin needles, termed *flowers of sulphur*: when combined with any alkaline salt, such as pot-ash, and melted in a moderate heat, and in a close vessel, a compound is produced, which is named *liver of sulphur*. This preparation is of a liver-brown hue; and, while dry, emits no peculiar odour; but, in a moist state, it evolves a very offensive smell resembling that of putrid eggs: it deliquates in the air, and is completely dissolved in water; the solution acquiring a yellow, golden shade. On melting it in a continued heat, till it grows tough, and assumes a red-brown colour, then pouring the liquid mass into water, it will remain as soft as wax, and yield to any impression from engraven stones, metals, or coins. After becoming cold, however, it recovers its former hardness and colour.

This mineral is usually imported in large irregular masses, which are melted into rolls, with the addition of coarse resin, flour, &c.; whence it assumes a pale yellow tint.

Sulphur is of great utility in the arts: when converted into an acid by combustion in the open air, it affords that extensively useful liquid, vulgarly termed *oil of* VITRIOL; considerable quantities of which are consumed in the various processes of bleaching, dissolving metals, especially iron, and in other useful arts: it is also of great service in cementing iron railing to stones, by simply melting, and pouring it into the interstices. See also GUN-POWDER....Brimstone is farther advantageously employed for whitening silk, wool, or other articles, by exposing them to its fumes, during combustion.

In medicine, sulphur is almost a specific in cutaneous diseases, whether administered internally with honey or molasses, or applied externally in the form of ointment. In the piles, it is of evident benefit, when taken in small doses; nay, it is occasionally prescribed in chronic catarrhs and coughs; as it operates gently, by promoting insensible perspiration through every pore of the skin.....See likewise ANTIDOTES.

SULPHUR-WORT, the COMMON, HOG'S FENNEL, or HARESTRONG *Peucedanum officinale*, L. a native perennial, growing in salt-marshes; producing flowers in the months of June and July....Both the roots and stalks of this saline plant are from three to four feet long; have a fetid odour, and an acrid, bitterish taste. If an incision be made in the former, during the spring, a considerable portion of yellow juice will exude, and concrete into a gummy resin, retaining the sulphureous smell of the root. The expressed juice of this plant was formerly employed in lethargy; but its medicinal properties have never been ascertained with precision.

As the sulphur-wort is an useless weed in meadows, it should be diligently extirpated; though BECHSTEIN observes, that the dried roots have been successfully employed in fumigations, to prevent the spreading of epidemic distempers among cattle.

SUMACH-TREE, or *Rhus*, L. a genus of exotic trees, comprehending 33 species, of which the following are the most remarkable, namely:

1. The *Coriaria*, or Elm-leaved Sumach, a native of Italy, Spain, Syria, Turkey, and Palestine, where it grows to the height of eight or ten feet. The branches of this species, when dried and reduced to powder, are substituted for oak-bark in tanning, particularly Turkey, or MOROCCO-LEATHER: its leaves are occasionally employed on the Continent in medicine, being reputed to be uncommonly astringent and styptic. TROMSDORF obtained from the reddish, compressed hairy berries of this tree, an essential acid salt, similar to that of lemons, by a strong decoction, and subsequent evaporation; when small white crystals were formed, on exposing it to a cold place. Both the root and berries produce a reddish, and the rind a yellow colour. In Germany, the clustered fruit of the elm-leaved Sumach is suspended in vinegar, to increase its acidity.

2. The *Copallinum*, Narrow-leaved, or Beach-Sumach.

3. The *typhinum*, Virginian Sumach, or Vinegar Plant. [See article RHUS.]

4. The *Cotinus*, or Yellow Sumach, a native of Asia, and the southern parts of Europe, is also cultivated in Germany. Its leaves and branches are likewise useful in tanning: the wood and bark yield an orange dye; and the latter, with the addition of Brazil-wood, imparts a chesnut-colour. GULDENSTADT remarks, that the leaves of this species are preferably employed by curriers; as they do not tinge the skin, excepting with a faint yellow cast; so that the *Morocco-leather* may subsequently be dyed of the most pleasing shades. PALLAS informs us, that the dyers of Astrakhan prepare the genuine *Turkey-red* on cotton, by a decoction of the leaves of the Yellow Sumach and galls; with a due proportion of alum; having previously soaked the yarn in fish-oil, which we suppose to be that obtained from the sturgeon.

SUNDEW, the ROUND-LEAVED, RED-ROT, or YOUTHWORT, *Drosera rotundifolia*, L. an indigenous perennial, growing in mossy bogs, and flowering in the months of July and August. The whole of this singular plant is acrid, and its juice is sufficiently caustic to erode corns, or warts; and, if it be pro-

perly diluted with milk, it forms a safe remedy for removing freckles, and similar blemishes of the skin. Any part of this vegetable coagulates milk, in a manner similar to that of the Common BUTTERWORT; and it is likewise supposed to occasion the *rot* in sheep. On the other hand, the growth of the Youthwort, in particular situations affords an useful guide in digging for *turf*.

SUNFLOWER, or *Helianthus*, L. a genus of exotic plants, consisting of 14 species, most of which are cultivated in Britain: the principal, however, are:

1. The *annuus (corona solis)*, or Common Sun-flower: it is easily propagated in any common soil, either by sowing the seeds, or by parting the roots in the month of March. Within a few weeks, the plants will appear; and, when about six inches high, they should be removed into the borders of gardens, or other places selected for heir growth, at the distance of 15 or 18 inches, in *quincunx* order. They must be occasionally watered; and, if weeds be properly eradicated, they will vegetate with such luxuriance, as to attain the height of six or eight feet: in July they bear flowers, which continue to blow till October, when they produce ripe seeds; which, on expression, yield a large proportion of a sweet palatable *oil*. The young flower-cups of this plant may be dressed and eaten like artichokes;...the stalks are of a considerable size, often exceeding an inch in diameter: hence, they may with advantage be raised in situations where *fuel* is scarce; indeed, we are not acquainted with any vegetable that is likely to afford greater advantages to an industrious cultivator who possesses a few acres of ground which, is not sufficiently fertile for corn or pasture-grass. It deserves, however, to be remarked, that it greatly tends to impoverish the land; as it requires constant moisture, and would not be productive without artificial irrigation.....See KITCHEN-GARDEN and PAPER.

[From a paper on the subject of sunflower-oil, in the first vol. of the *Trans. Amer. Phil. Society*, it appears that one bushel of seed, yields three quarts of oil; and that this quantity of seed is produced from one hundred plants, set about three feet apart, in the same manner that Indian corn is planted.... The oil is thin, clear, and of an agreeable taste. It is recommended to set the seed in a hole, and, when the plant is a yard high, to throw in the mould round the stalk, so that the surface of the ground may be even around it.

The process for expressing the oil is the same as that for making linseed-oil. It is suggested, that cold drawn oil is less liable to turn rancid than when heat is used: but the quantity is less. If, however, care be taken, constantly to stir the mash in an iron pot, over a moderate fire, (or if pressed) not to heat the plates too much, there will be no danger of burning the oil. There can be no doubt, that the sunflower, on poor land, would yield much more profit than many other crops.]

2. The *tuberosus*, or Tuberous Sun-flower, a native of Brazil, likewise bears single stalks, which frequently attain the height of 9 feet. Having already described this species, under the head of ARTICHOKE, the *Jerusalem*, we shall only observe, that it produces no

ripe seeds, and bears smaller flowers than the preceding; but it is more easily propagated: for, when the roots are once planted, they incessantly vegetate in the same soil, without requiring rich manure, or great attention; and, though left throughout the winter in the ground, they withstand the severest frost.

The different species of the Sun-flower have, hitherto, been cultivated only for ornament; but it must be obvious, that they may be rendered subservient to many economical purposes, especially as substitutes for *hemp*, in manufacturing pack-thread from their strong fibrous stalks. Lastly, it deserves to be noticed, that the flowers of these plants regularly take the direction corresponding to the sun's course, while they afford to *bees* a considerable supply of honey.

SUN-SCORCHED, is a term employed by gardeners, to express a distemper affecting fruit-trees, in consequence of their sudden exposure to the heat of the sun; so that the fruit becomes withered.

The trees, chiefly liable to such injury, are those placed in situations, which seclude them from the vernal sun; so that they cannot afterwards sustain its scorching rays during the summer. It may, however, be prevented, by planting fruit-trees in proper aspects; and, if such as are affected be timely attended to, the disease may be removed by frequent and copious irrigation.

SURFEIT, in physiology, is an indisposition attended with nausea, and the sensation of a load at the stomach, which are generally occasioned by indolence, and excess in eating or drinking; though the disease sometimes arises from an error in the quality of the diet. During this affection, the insensible perspiration is impeded, and the skin is often covered with eruptions.

If a surfeit originate from the use of muscles, corrupted meat, or other unwholesome animal food, it will be advisable speedily to resort to an emetic; and, after its operation to drink frequent and copious draughts of vegetable acids, diluted with water. But, in cases where *excess* in eating or drinking is the immediate cause of the complaint, the first passages ought to be evacuated by proper purgatives, and afterwards such medicines administered as tend to restore the obstructed perspiration, and at the same time promote the secretion of urine.

SURFEIT, in farriery, a disease chiefly incident to horses: it may be occasioned either by suffering them to drink immoderate portions of cold water, while they are in a profuse perspiration; or by neglecting them, when HIDE-BOUND. The skin is affected with eruptions; and (as farriers express themselves), the body is filled with inflammatory crudities.

Such are the general symptoms indicating a *surfeit*, the mildness or malignity of which, depends on the age, habit, and constitution of the horse. With a view to remove the disease, a moderate quantity of blood should first be drawn, in order to accelerate its circulation: a few warm mashes should next be given, to open the body; and after them, two or three of the following purgatives, according to circumstances: Let one ounce of Barbadoes aloes; three drams of

pulverized jalap; two drams of cream of tartar; and a similar portion of Castile soap, calomel, and ginger in powder; be mixed with syrup of buckthorn, sufficient to form them into a ball...These medicines ought to be divided into three doses, administered at proper intervals: the diseased animal being carefully sheltered from the cold; and, on the third day after the last dose has been taken, Mr. TAPLIN recommends the following alteratives:....To half a pound of levigated antimony, and an equal portion of sulphur, let four ounces of each, cream of tartar, and Æthiop's mineral, be added; the ingredients be perfectly incorporated, and then divided into 12 parts, each consisting of two ounces: one dose should be given every night with the corn (the latter being previously sprinkled with water, so as to retain the powder), for a month; and, in case no advantage be perceptible, the dose must be increased to $2\frac{1}{2}$ oz. during the first week, and to 3 ounces in the second week. Throughout the whole course, two ounces of nitre ought to be given every morning, in a pailful of soft water. Should any scabs or excoriations appear on the surface of the body, they may be removed, by washing them with equal parts of soap-leys and lime-water.

SUSPENDED ANIMATION. See ANIMATION.

SUSPENSION BY THE CORD, or HANGING, is either the act of suicide, or that of being suffocated, by means of a rope tied round the neck; in consequence of which, the vital principle is extinguished.

As many persons unfortunately perish, who are from various causes induced to resort to this fatal expedient, we shall briefly state the symptoms, or external signs, by which it may be ascertained, whether they died in consequence of strangulation; and also point out those remedies which have been suggested for the recovery of life.

Symptoms of apparent death, by suffocation with the cord;.....The external aspect somewhat resembles that of drowned persons; the face is uncommonly swoln, and of a deep red hue; so that every feature is distorted: the eyes are inflated, and project from their sockets, a bloody froth appears at the mouth; all the vessels of the neck and face are distended; and swallowing is totally impeded.

Treatment:....1. The cord must be instantly cut; the suspended body being gently taken down, every ligature ought to be removed; the head should be supported in an erect posture, and turned towards the left side. 2. Air must be blown upon the face, which should also be sprinkled with cold water. The gullet ought to be stimulated by a feather moistened with oil; and vinegar be applied to the nostrils, while the regions of the heart and throat are gently compressed. Farther, the patient ought to be wrapped in warm flannel, or placed between feather-beds; and a bladder, filled with tepid water, applied to the pit of the stomach: the whole body may also be fomented, or immersed in the luke-warm bath.

Stimulants:....1. Moderate friction with warm flannel, to be gradually increased on the left side. 2. The shower-bath, combined with friction. 3. Stimulating clysters, consisting of salt-water and oil: none of these remedies, however,

must be resorted to, where the blood appears to be determined towards the heart and head.

As soon as the first symptoms of resuscitation become evident, the blowing of air into the nostrils, and aspersion of cold water on the face, ought to be continued: next, clysters, consisting of a strong solution of emetic tartar, ought to be administered; and the sugillations, or injured parts, be fomented with wine, in which chamomile flowers have been infused. Lastly, when the ability of swallowing is restored, the patient should take frequent draughts of vinegar diluted with cold water, and mild, cooling laxatives.

SWALLOWING, or DEGLUTITION, is the act of taking any food, whether solid or liquid, down the throat. It succeeds MASTICATION, and is performed primarily by the tongue, which propels the aliment into the gullet; whence, by the contraction of the muscular parts, the contents are conveyed into the stomach. See also DIGESTION.

Deglutition may be impeded or obstructed by various circumstances, such as swellings in the throat, or the taking of acrid, pungent, or pointed substances into the mouth: but, as the most simple and expeditious remedies for such affections have already been pointed out, the reader will consult the articles GULLET, GARGLE, QUINSEY, METALLIC *Pointed Substances*, &c.

SWALLOW-WORT, the COMMON, or *Asclepias alba v. Vincetoxicum*, L. a hardy exotic plant, which is a native of the south of France, Spain, and Italy. In a fresh state, the root of this vegetable possesses a strong smell, resembling that of valerian; to which, however, it is inferior in its sudorific and diuretic properties.

The stalk of the Common Swallow-wort is fibrous, and has on the Continent been employed as a substitute for *flax*: by mixing it with silk, M. De BIBORCZFALVA, a creditable economist in Hungary, has lately produced a mixed cloth, which was remarkably fine, and cost him about 4*s*. the yard, English measure; being from 50 to 60 inches wide.

There is another species of this exotic, namely, the Syrian Swallow-wort, or Silk-plant (*Asclepias Syriaca*, L.) a native of North America, and especially of Virginia. Its strong stalks attain the height of seven feet: the pale purplish flowers appear in June or July; emit an agreeable odour; and are succeeded by large, thick, and rough capsules, the seeds of which are furnished with a long, glossy *silk*. In this respect, it forms one of the most valuable productions; and as the experiments lately made in Silesia, fully evince that it may with equal advantage be raised in the more temperate climate of Britain, we strongly recommend its culture, which is generally successful in the most indifferent soils. It may be propagated either by the seeds or roots; vegetating most luxuriantly in a loose, sandy, and rather damp, ground. The seed should be sown in the spring, and the young plants be transplaced into a well ploughed and manured land, where they must be properly weeded in the succeeding summer, and hoed, after having attained the height of 3 feet. When the principal stem displays the flowers, all

the collateral branches and leaves should be carefully removed. The fruit attains to maturity in August, or September; and as soon as the external rind becomes soft, yellow, and wrinkled, the seed capsule is to be cut off during dry weather, and allowed to burst spontaneously. The dry stalks are next to be separated by the knife, applied closely to the root; the decayed plants must be re-placed by the roots of others; then thinly covered for the winter with long dung; and in the succeeding spring, the surrounding earth should be loosened. Although BECHSTEIN, who has furnished us with this account, does not mention the distance at which the plants ought to stand; yet their size appears to require considerable space, so that they may be, at the least, 12 inches apart, in every direction. The silk, obtained from the seed-capsules of the Syrian Swallow-wort, is not only useful for stuffing pillows, spinning fine yarn, both by itself and mixed with cotton, animal wool, and cod-silk, or the loose filaments of the cocoons; but it also affords a valuable material for manufacturing *paper* of a superior quality. Its stalks may be advantageously employed as substitutes for *hemp*. In Canada, a brown *sugar* is extracted, by evaporating the juice of its flowers; and, in Germany, the young tops are eaten as *asparagus*: hence, the assertion of some naturalists is erroneous, that the milky juice of this plant is of a poisonous quality.

[This plant abounds in the neighbourhood of Philadelphia, and deserves to be cultivated for the many valuable purposes to which it may be applied. Dr. GUTHRIE (*Manchester Memoirs*, vol. 5,) says, that in Germany the plant is cultivated extensively, and that stuffs have been made from it, which rival in lustre the true animal silk. The stems are said to dye a good olive; and also to answer for candle wicks.

SWAMP. Under the heads DRAIN and MOSS, the mode of recovering has been fully treated. For an elaborate treatise on the subject, the reader is referred to Dr. ANDERSON's *Rural Essays*.]

SWARD-CUTTER, a machine employed for cutting the *sward* or surface of the earth, so as to break every clod that might otherwise resist the action of spiked rollers, or any similar implement of agriculture.

In the *Letters and Papers of the Bath and West of England Society*, we meet with an account of a Sward-cutter, invented by the Hon. ROBERT SANDILANDS, and which promises to be of great utility to the husbandman.

The original design of the Sward-cutter, was that of preparing *old grass land* for the plough, by cutting it across the ridges, either at the commencement, or in the course of the winter.

[This machine is much too complicated for general use among farmers; the account of it is therefore omitted.]

SWEARING, a term used to denote either the uttering of impious expressions, or the judicial, and also official invocation of the Deity, to attest the truth of an assertion.

The security of *oaths* in important affairs, has in all ages been required by the laws of civilized nations; nor is *swearing*, on such occasions, prohibited by the Christian doctrine. But, though particular

circumstances may sanction this expedient, there is no possible excuse for invoking the Creator, to attest the truth of every trifling transaction, or to witness the impertinence of idle, perhaps indecent, conversation.

SWEAT, a perceptible moisture, issuing from the pores of the skin, either in consequence of too violent exercise, or from the action of certain medicines, which are hence denominated *sudorifics;* though it is sometimes occasioned by great debility of the cutaneous vessels, when it is called a *cold sweat.*

SWEATING-SICKNESS, an epidemic which raged in England in 1481, and returned seven times between that period and 1551; in which year it proved so fatal, as to carry off 120 inhabitants of Westminster in one day. It commenced with a most profuse fit of sweating, which attacked the patient, and often terminated his existence in one, two, or three hours; though its violence continued for the space of 15 hours; and, if he survived 24, the danger was generally overcome.

The most correct account of this national scourge, is that published by Dr. CAIUS, who states the symptoms to have been, a sensation of a hot vapour pervading a particular limb, whence it extended over the whole body, being accompanied with intense thirst; extreme internal heat; profuse sweating; anxiety; drowsiness; sickness; a violent pain in the head, and delirium....Dr. C. conjectures the immediate cause of this sickness, in 1551, to have proceeded from thick fetid fogs, that arose from putrid matters; unclean habitations, and the neglect of clearing drains; all which remarkably contaminated the air.

It is remarkable, that the persons most liable to the contagion, were those in full health, of middle age, and of the higher classes; while children, the poor, and the aged, were less subject to its influence.

[SWEEP CHIMNEY. The *Society for the Encouragement of Arts,* in London, among the many important subjects to which they have turned their attention, (to the *very great improvement* of the arts,) meritoriously offered a premium for the best substitute for human labour in sweeping chimnies. The following account of one of the plans offered to the Society, has been published in an English gazette: the detailed plan by the inventor, will, no doubt, appear in the next volume of the *Transactions of the Society.* It is sincerely to be wished, that Mr. SMART's ideas may also be carried into effect in the United States.

"The machine invented by Mr. SMART, of Camden-Town, England, for sweeping chimnies, consists of a number of wooden tubes, of about thirty inches long, and three quarters of an inch in diame, ter, which run on a rope or cord- and fastened into one another, to any length. To the upper tube is fastened a square brush, the block of which is about six inches long, by three wide; and from it, on all sides, issues *heath, broom,* or any other stiff but flexible substance, large enough to fill the breadth of the chimney. The tubes are about thirty inches long, of course the joints between each will bend to the most crooked chimney, and in coming down must clear the corners, ledges, &c. which are some-

times found in chimnies. In the course of the present year, Mr. SMART has, in the presence of many respectable witnesses, effectually cleansed several lofty and crooked chimnies. So completely does this invention answer the plan proposed by the several societies who have undertaken to advocate the cause of the poor climbing-boys, that nothing is now wanting to put an end to the common mode of chimney-sweeping. By Mr. SMART's method, a chimney fifty feet high, may be swept in six or eight minutes, and with much less dirt than happens by the common mode."]

SWEET-BRIAR. See vol. iv. p. 414.

SWEET-FERN. See CICELY, the Sweet.

SWEET-FLAG. [See ACORNS.]

SWEET-WILLIAM. See vol. iv. p. 276.

SWEET-WILLOW: See GALE, the Sweet.

SWIMMING, is the art of floating, or supporting the human body on the surface of water, with a progressive undulating motion.

This art is in a manner natural to man (see AMPHIBIOUS ANIMALS); and, from its evident utility, it has in all ages formed part of the education both of barbarous and civilized nations....As an outline of the principles on which it is practised, may be a mean of saving persons accidentally fallen into deep water, we shall give a few directions to that effect, selected from the instructions of Dr. FRANKLIN, and confirmed by our own experience. First, the learner ought to walk courageously into the water, till the fluid reaches to his breast; when he must gently decline his belly towards the surface; the head and neck being erect; the breast pressing forward; the thorax being inflated, and the back bent. Next, the legs must be withdrawn from the bottom, while they are extended or stretched out; and the arms should be stricken forwards, corresponding with the motion of the former.

Swimming *on the back* is not essentially different from the method just described, excepting that the arms are *not exerted*, and the progressive motion is derived solely from the striking of the legs.

With respect to *diving*, or plunging under water, Dr. F. observes, that the swimmer must close his hands together; and, the chin being pressed upon his breast, he ought to make an exertion to bend forwards with energy: while he continues in this position, he should move with velocity under the water; and, when he wishes to return to the surface, it will be sufficient to bend his head backward, in consequence of which he will instantly rise.

From the natural timidity, or antipathy to water, which in some individuals is constitutional, novices in swimming have been advised to employ bladders or corks, for the purpose of supporting the body above the surface; a practice which has been severely censured. Dr. F. is, however, of opinion, that such auxiliary means are *useful*, while the pupil is acquiring the mode of drawing in, and striking out the hands; which is absolutely necessary to a progressive motion. But, as no person can become a perfect adept, till he can sufficiently confide in the capacity of the water to support him, he ought to walk into a

place, where it grows gradually deeper, till it reach to the breast: the face must then be turned towards the shore, and an egg be thrown into the water, to such a depth that it can only be obtained by diving. The novice is then to plunge down, when he will find that the element buoys him up against his inclination: he will feel its power of keeping him afloat, and consequently learn to venture into it, without apprehension.

Considered as an exercise Swimming is equally amusing and useful; because it combines the advantages of the cold bath and muscular exertion. Hence we would uniformly recommend to plunge into the water *with the head* foremost; while the body is neither cold nor overheated: no dangerous rivers, or muddy streams, should be selected; nor should this attempt be made, till the water has in some degree been warmed by the genial rays of the sun....Other precautions, necessary to be observed, have already been stated under the article BATH. See also BAMBOE-HABIT, and CORK.

[Swimming Jacket....From the History of the Royal Academy of Sciences at Paris, for the year 1765.

This swimming jacket was proposed to the Academy, by the Abbot de la Chapelle, under the name of Scaphander, or 'Man in a boat,' from the Greek words Σκάφη, boat, and ἀνηρ man. It is a sort of waistcoat without sleeves, which descends as far as the hips, and buttons before. It is composed of two strong pieces of tent-cloth or ticking, between which are fixed some square pieces of cork, and the whole is closed at bottom with a border of double cloth, projecting from the back to pass between the swimmer's legs, and to be fastened before. By the help of this jacket, and the art wherewith the Abbot de la Chapelle has distributed his pieces of cork in it, one may float in the water standing, and keep the head and arms above water. In the experiment that was made of it by the Abbot de la Chapelle, he could converse with those that were in a boat to see him; he could lift to his mouth victuals and drink, fire off a pistol; flourish with a sword, stick, &c. assume all possible situations, and make progressive motions by the help of his hands and legs. The notion of these sorts of jackets is not new. The Academy gave an account of one, in 1757, presented by M. DE GELACY, Colonel of foot, and was not ignorant of the attempts that had been made by M. DE PUY-SEGUR for swimming, by the help of a belt of cork, fastened to a sort of cloth slipper, the sole of which was loaded with lead. This would be a good expedient for soldiers, who were to swim over a river with their arms in their hands: but, as to the case of shipwreck, which the ABBOT DE LA CHAPELLE had principally in view, it appears, that his scaphander is preferable to all the inventions of this sort hitherto known, as well because it is more secure in point of use, as because, in a sudden and unexpected case, its application is more ready, and it causes no embarrassment. See SPENCER and CORK.]

SWINE. See HOG.

SWINGING, a species of passive exercise, which is performed in certain contrivances, known under the name of *swinging machines*, or *cars*; by the undulating motion of which, the body is tossed in an

ascending and descending direction.

Swinging greatly contributes to health; and has occasionally proved very serviceable to persons of consumptive habits: it is likewise of considerable advantage to sedentary individuals; but it ought not to be repeated, if it excite giddiness, head-ach, or other unpleasant effects.

SWOON, or *Syncope*, is a sudden fainting, in which the action of the heart is diminished, or for a time entirely suspended. It is generally preceded by anxiety, difficult respiration; the pulse being low and tremulous; the patient turning cold and pale, so that he is nearly deprived of all sensation......In some instances, these symptoms are more urgent; the limbs are flexible, but exhausted of their strength; and the whole body is in a state of deadly, cold torpor. It is remarkable, that patients, during the fit, often hear the whole conversation respecting them, but feel the want of power to exert themselves: the recovery is, in most cases, announced by deep and heavy sighs.

When swooning occurs in the commencement of acute disorders, it is generally an unfavourable omen; though, in the advanced stages, it is less alarming: in violent bleedings, it frequently affords relief; but, when faintings occur, without any apparent cause, there will be just apprehension of danger.

Causes :....Long continued exertions of the mind, such as deep study; violent passions; loss of strength from profuse evacuations, particularly of blood; hunger; pain; want of rest; surfeits; impure air; worms; narcotic poisons; and affections of the interior organs.

Cure :....The patient should immediately be exposed to the open air, and be sprinkled with cold water on the neck and face. Strong, pungent odours, or volatile spirits held to the nostrils, ought to be used with caution: and only where the strength of the patient has been considerably reduced, especially in hysterics and hypochondriasis; in these cases, spirit of hartshorn, tincture of valerian, castor, or asafœtida may be inhaled with advantage....If the swooning originate from anger, and be attended with nausea, vomiting, bitter taste, and pain at the pit of the stomach, a gentle emetic may be given, with copious draughts of warm chamomile tea: similar means may likewise be employed in consequence of a surfeit..... Persons of a plethoric habit, when fainting from violence of passion, ought immediately to lose a few ounces of blood from the arm; and afterwards take a cooling aperient, for instance, infusions of senna, tamarinds with manna, salts, &c. If it arise from excess of pain, benefit may be derived from opium: and, when it is occasioned by a fit of terror, or a sudden fright, first blood-letting, then small doses of laudanum and antimonial wine, (from five to ten drops of the former, and double that proportion of the latter), will tend to compose the nerves, and to promote perspiration.....Poisons and worms require the treatment mentioned under their respective heads.....When the fit of swooning is the effect of too violent purgatives or emetics, a few drops of the tincture of opium, in conjunction with an aromatic

wine, will prove the most proper remedy.

In cases of great debility, it will be necessary to abstain from all stimulating food or drink, and to use the mildest astringents, in combination with a bland and nourishing diet. During the paroxysm, frictions of the extremities with hot flannels, will greatly assist the recovery of the patient.

Should, however, this state of suspended ANIMATION, be the effect of LIGHTNING, SUFFOCATION, SUSPENSION, &c. the proper means of resuscitation will be found in these respective articles.

SYCAMORE-TREE, or SYCAMORE MAPLE; *Acer Pseudo-platanus*, L. a large and beautiful tree, supposed to be a native of Germany, but reared in Britain, principally for the sake of its elegant appearance in plantations....It is of quick growth, though increasing in size till 200 years old, and attaining the respectable age of four centuries: it flourishes in exposed situations near the sea, where a plantation of these trees, at 50 feet asunder, interspersed with three sea sallow-thorns between every two of the former, makes an excellent fence against the *spray* of the ocean. The sycamore, thrives in a loose black earth; [it may be propagated by cuttings,] and the young trees ought to be transplanted at the age of 15 or 20..... Its wood is soft and white, readily works in the lathe, and is employed by turners, for manufacturing wooden bowls, dishes, trenchers, &c. When the sap rises in the spring, or retreats in the autumn, a considerable quantity of sweetish juice exudes from a hole made in the trunk, about 12 inches from the root, amounting *daily* to 7, 8, or 10 quarts from each tree. The Highlanders convert this liquor into an agreeable, and wholesome wine: when clarified, evaporated, and subsequently inspissated, it affords a fine, white sugar (in the proportion of one pound from 16 quarts of the sap); which, however, is too purgative for common use....There are two varieties of this tree, one having broad leaves and large *keys*, while those of the other are variegated: the latter is propagated chiefly by inoculating and ingrafting; as it seldom produces perfect seeds.

SYMPATHY denotes an unison or agreement of affections and inclinations; or a conformity of natural qualities, or temperaments; in consequence of which two persons are mutually attached to each other. It also signifies the participation in pain or pleasure experienced by another individual; though it is likewise defined to be an *imitative* and *involuntary* faculty; for instance, yawning, and laughing, which affect different persons in a similar manner, and at the same time.

Dr. JACKSON considers *Sympathy*, as relating to the operations of the mind; to the activity of the imagination; and to the impressions made on the external senses. Thus, he observes that the various *passions* and *affections* of the mind produce different corresponding sensations in the body, and generally determine the animal spirits to those parts which are most liable to be influenced; for instance, fear and anger to the heart: compassion, amazement or wonder, sorrow, joy, &c. to the head:

Another proof of sympathy is the participation in the feelings of others, whose propensity to mirth,

or gravity, or to sadness and melancholy, is in a manner contagious to whole companies.

The operations of the *imagination*, however, as connected with sympathy, are chiefly confined to the body ; and,in general, influence only persons of weak minds: hence arise many of those monstrous deformities occurring in the metropolis, but which might have been obviated by a proper exertion of reason, before the fancy was too much excited by the most seductive faculty, namely, that of *vision*.

The *senses* receive a sympathetic impression from odious or disgusting objects. Thus, disagreeable sounds *set the teeth on edge*, and produce an universal tremor or shivering: the taking of nauseous draughts, or other drugs, occasions a shaking of the head and neck. Similar effects arise from unpleasant odours ; and, if a person suddenly withdraw from the sun into the shade, or from a light place into a dark room, an inclination to shudder will be the immediate consequence.....Those readers, who are desirous of obtaining farther explanations of these ideas, will derive instruction from the perusal of Dr. JACKSON'S *Treatise on Medical Sympathy*, (8vo. 5*s*.)....Some ingenious conjectures on this subject also occur in Dr. ADAM SMITH'S *Theory of Moral Sentiments*.

SYRUP, a solution of sugar, frequently employed as a vehicle for various medicines ; forming a sweet liquor, of a thick consistence, which is made by combining saccharine matter with water, vinegar, or the juices of vegetables.

Syrups were formerly considered as medicines of considerable efficacy ; but, at present, they are used chiefly for sheathing, or concealing the taste of nauseous substances ; yet, as there are certain drugs, which are peculiarly serviceable in this form, we shall give a few directions for preparing them : First, the vessels employed ought to be well tinned, and kept perfectly clean, lest any impure matters be introduced : the sugar should be doubly refined and dissolved in a water-bath, in the proportion of 29 oz. to one pint of water, or any other liquid : the whole is then suffered to stand for 24 hours, when the scum must be removed, the syrup be strained, and poured into a vessel, where it remains till the following day. If any saccharine crust then appear, it ought to be taken off the surface, and the liquor will be fit for use.

Syrup of Vinegar :.....Let $2\frac{1}{2}$ pints of vinegar be boiled with $3\frac{1}{2}$ lbs. of double-refined sugar, till a syrup be formed. This solution is very pleasant ; is often employed in mucilaginous mixtures ; and, from its cheapness,is far preferable to the syrup of lemons.

Emetic Syrup consists of two drams of finely pulverized glass of antimony, and 12 oz. of Rhenish- [or Lisbon, Teneriffe, or Fayal-wine :] these ingredients must be digested in a gentle heat for three days, when the liquor ought to be strained through paper, mixed with double-refined sugar, and made into a syrup in the usual manner. This preparation is strongly impregnated with the emetic properties of the antimony, and is peculiarly calculated for children, on account of its agreeable taste.

Syrup of Lemon-juice :......Let

five parts of double-refined sugar, and three parts of filtered lemon juice be incorporated, so as to form a syrup. The juices of mulberries, raspberries, and black currants, may be converted into syrup in a similar manner: they are all cooling, pleasant liquids, and may be advantageously employed for mitigating thirst in bilious, or inflammatory disorders; and also for *gargling* the fauces, in cases of inflammation of the mouth and tonsils.

T.

TACAMAHACA, a gummy-resinous substance, obtained from the Carolina POPLAR. The best sort is collected from the fruit of the tree, in gourd-shells: it is somewhat soft and unctuous, of a pale-green, or yellowish colour, and a fragrant odour, resembling that of amber-grease, or lavender. The drug commonly met with in the shops, consists of variegated semi-transparent grains, procured from the sap exuding through incisions made in the poplar; and which are greatly inferior to the genuine species.

Tacamahaca is chiefly employed externally, for discussing tumors, promoting their maturation, and mitigating pains in the limbs; though the finer sort may be advantageously used for the same purposes, as other balsamics.

TALC, a species of fossil, found in England, Bohemia, Spain, &c. comprehending three varieties, namely:

1. The *Talcite*, or Scaly Talc, is dug in small light scales, which adhere to the fingers: it is white, intermixed with green; and, when rubbed on the skin, imparts a bright gloss.

2. The *Venetian*, or Common Talc, is also white, interspersed with green or red veins.

3. The *Schistose* Talc is of a slaty nature, and a grey hue, spotted with white, green, or blue; but, on exposure to the air, it becomes white and scaly.

This mineral is employed in preparing compositions for earthen vessels: on account of its smoothness, brightness, and unctuous quality, it has been celebrated as a cosmetic; and various unsuccessful experiments have been made, with a view to extract from it oils, salts, and other supposed ingredients....When combined with alkaline salts, it is fusible in a strong heat, and forms a transparent, handsome, greenish-yellow glass: if equal portions of talc and of chalk be melted together with one-fourth part of borax, the mixture will produce a fine pellucid greenish glass, which is of considerable lustre and hardness: gypsous earths

may also with advantage be substituted for the chalk, and the result will be a beautiful, pellucid yellow glass, of equal brightness and durability.

TANNING, is the art of preparing leather from raw skins and hides, so as to render it more pliant and durable.

The processes employed for this purpose, are various; every tanner adopting some peculiar method: we have therefore selected the following, which is practised with little difference, in the metropolis and its vicinity; where the leather is divided into three sorts, known under the names of *backs*, or butts, *hides*, and *skins*.

The strongest hides are selected for the *butts;* and, after being divested of the horns, they are laid in heaps for one or two days during the summer, and for the space of five or six, in the winter. Next, they are suspended on poles in a *smoke-house*, or room containing a fire, made of wet tan, to induce a slight degree of putrefaction, so that the hair may be stripped off; an object which is effected by spreading such hides on a wooden *horse*, and scraping them with a curved knife. They are then immersed in water, to be cleansed from all dirt, and extended a second time on the *horse*, when all extraneous matters must be carefully removed. The hides are now steeped in a pit containing *ooze*, or a strong liquor, prepared by infusing ground oak-bark in water; after which they are plunged into another pit, containing water powerfully impregnated with oil of vitriol, or with an acid obtained from rye or barley. They are next immersed in another pit filled with water; a stratum of bark being strewed between each hide. In the course of five or six weeks, the skins are taken out; and the water together with the decayed bark, being removed, the pit is a second time filled with *ooze;* the hides are again macerated, with similar strata between each, for three months. The same operation is then repeated a *third*, and, after the lapse of three months, a *fourth* time: here the hides remain for three months longer, at the expiration of which they are completely tanned; being thus drawn out, they are suspended on poles; when, after being compressed by a steel pin, they are beaten by wooden hammers, or *beetles*, to render them smooth; and then dried for sale.

The leather known under the name of *hides*, is made from the skins of cows, and those of lighter oxen, in the following manner: The horns are first taken off, the hides washed and immersed in a pit full of lime-water, where they remain for a few days; after which the hair is stripped off, as above described. They now undergo various processes, similar to those already detailed, excepting that the ooze is not at first of equal strength; and that the hides are shifted every second or third day, for the space of six months, into a stronger liquor; being at length put into a very rich ooze, where they are turned twice every week, for two or three months. Thus prepared, they are carried to another pit, with layers of bark arranged between each hide; the process being again repeated for a similar period, when they are taken out, and treated in the same manner as the *butts*. Both species of leather here described, are employed for the soles of pumps,

shoes, boots, &c.; being finer or stronger, as occasion may require.

The last division of leather is that of *skins*, which includes all that is manufactured from those of calves, dogs, &c. They are washed in water: then plunged in lime-water, and deprived of their hair by the same operation as *hides*; after removing all uneven and superfluous matters, the skins are soaked in a pit of water impregnated with the dung of pigeons, for a week or ten days, in order to extract all the particles of lime, grease, &c. Next, they are treated in a similar manner with the hides; and, in the course of five or six months, they will be sufficiently tanned.....The leather thus prepared, is now conveyed to the currier; and, after undergoing the process detailed, vol. ii. p. 299, it is used for the upper parts of boots, shoes, &c.

Such are the *old* methods commonly practised in tanning: these, however, being too tedious and expensive, various expedients have lately been devised, with a view to shorten the respective processes, and to procure substitutes for oak-bark. Thus Dr. MACBRIDE proposed the use of vitriolic acid, instead of that obtained from vegetables; which, having been found very serviceable for distending the pores of the skins intended for *butts*, has been generally adopted by tanners; as it improves the leather in point of durability; and at the same time tends to facilitate or simplify the operations. He also recommended lime-water to be substituted for the common fluid, to promote the extraction of the astringent matter from the oak-bark; but, the former being very powerful, and apt to injure the texture of the leather, it is seldom employed.

[Mr. SEGUIN has proved, that in the water impregnated with the soluble parts of tan, there are two very distinct and different substances: the one which precipitates a black matter from iron, is the *gallic acid* or *principle*; the other, which precipitates animal gelatin or glue, is called the *tanning principle*, on account of its efficacy in the preparation of leather. This discovery enables us to ascertain the presence of the tanning principle in any substance immediately; for every substance of which the infusion is capable of precipitating animal gelatin, possesses it.

The experiments of Mr. BIGGIN, (*London Philosoph. Trans.* 1799,) shew, that similar barks, when taken from trees at different seasons, differ as to the quantities of tannen they contain, and Mr. DAVY observed, that the properties of the astringent principle in barks, vary considerably according as their age and size are different; besides, these proportions are often influenced by accidental circumstances, so that it is very difficult to ascertain their distinct relations to each other.

Mr. DAVY, (*Trans. Royal Soc. Lon.* 1803.) is of opinion, "that as lime and pot-ash form compounds with tannen, which are not decomposable by gelatin, it follows that their effect must be highly pernicious, and that there is very little reason to suppose, that any bodies will be found, which, at the same time that they increase the solubility of tannen in water, will not likewise diminish its attraction for skin." Dr. MACBRIDE's recommendation therefore of lime, does not appear judicious, and the excellent hint of

Mr. DAVY should be carefully attended to by all who make experiments upon tanning.

From some late experiments by Dr. G. WILKINSON, it appears, that the bark of the broad-leaved willow, (*salix latifolia*) possesses the astringent or tanning principle in a very large proportion (see TORMENTIL) and that the nitric acid acts more powerfully on vegetables containing tan, than either the sulphuric or muriatic acids: the former of which, according to Dr. WILLICH, is used by the London tanners. See, *Experiments and observations on the Cortex salicis Latifoliæ, or broad-leafed willow bark*, by Dr. WILKINSON, New Castle upon Tyne, 1803, 4*s*. 6*d*.]

Oak-leaves, gall-nuts, dried and pulverized heath, the barks of the birch and willow-trees, the dried and powdered leaves of the wild laurel, and numerous other vegetable productions, have been tried, and proposed, as useful substitutes for oak-bark: numerous experiments were also made with plants, by GLEDITSCH, BAUTSCH, BOHMER, and other writers; but, as we state the results of these in the progress of our work, it remains only to mention the following patents, among the multitude granted at different periods; namely: 1. The privilege obtained by Mr. SAMUEL ASHTON, in January, 1794, for his new method of tanning..... 2. Mr. JOHN TUCKER's patent, dated in May, 1795, for a mode of tanning and making leather in a much shorter period, and of a superior quality, than can be effected by the common method......3. Mr. WILLIAM DESMOND's in January, 1796; for a process communicated to him (by Mr. SEGUIN), of tanning hides, &c. by rendering them more solid and incorruptible in water.....4. Mr. ROBERT CROSS's, in April, 1797, for a tan-pit on a new construction, and a method of tanning in one-half of the usual time, &c.....5. Mr. FRANCIS BREWIN's, in June, 1799, for an improved process of tanning hides and skins.....As the specification of these patents, however intersting to the tanner, are partly too diffuse, and partly of such nature as not to admit of abridgment, the curious reader will consult the 1st, 3d, 6th, and 11th vols. of the *Repertory of Arts*, &c. where full specifications are inserted, and occasionally illustrated with plates.....See also CURRYING, HIDES, LEATHER, SKINS, &c.

TANSY, the COMMON, or *Tanacetum vulgare*, L. an indigenous perennial, growing in elevated meadows and pastures, on the banks of rivers, and in swampy situations; flowering in the month of June.

This plant possesses a warm, bitter taste; it is deobstruent, not ungrateful to the palate; and may be used as a substitute for *hops*.... The tender leaves are sometimes employed to impart a colour and flavour to puddings: according to Dr. WITHERING, its seeds are an excellent vermifuge; and, if any animal substance be rubbed with this herb, it will be effectually preserved from the attacks of the *flesh-fly*......Tansy-tea is recommended as a preventive of the *gout*.....From the expressed juice of this vegetable, the Finlanders obtain a *green dye*.....The plant is eaten by cows and sheep, but refused by horses, goats, and hogs.

[TAP-COCK. A very ingenious contrivance to prevent the necessity of a vent-peg, in a beer or

cyder barrel, was lately invented by Mr. ROBERT HARE, Jun. of Philadelphia. It has two perforations, one for the admission of air, commencing at the point of insertion in the cask, and terminating at the top of the key; another for the emission of the fluid, commencing at the same point, and proceeding to the nozle in a direction nearly similar to that of the instrument in ordinary use..... By this highly useful economical invention, vast quantities of liquor which are annually made sour or vapid by the careless omission of the vent-peg of barrels, will be preserved from acidity, and in their original briskness.

The editor has a pleasure in being able to say, that the inventor is about taking measures to bring this excellent Tap-cock into general use; and that a more full account, illustrated by engravings, will be found in the 6th vol. of the *American Phil. Trans.* now in the press by Miss AIKIN.]

TAPE-WORM, or *Taenia*, is one of the most tormenting worms, breeding in the bowels of the lower animals, as well as of mankind, and consisting of several species, namely; the armed and unarmed; the long and short-limbed, or broad tape-worm; but that most frequently occurring in Britain, is the *solium*, which moves about, and has a regular round head, resembling a wart. It is from one, to twenty yards and upwards in length; the body is composed of a number of articulated rings, or joints, by which it attaches itself to the membranes of the intestines.

The symptoms by which the presence of this creature may be ascertained, are those of worms in general, such as nausea; vomiting; giddiness; indigestion; colic; and flatulence: the patient feels a pressure in certain parts of the abdomen: which, on shifting its place, mostly produces a chilling sensation in the lower belly, or in the back. A more certain, and indeed the only criterion is, the expulsion of one or more pieces of the worm itself.

Cure:.....An extraordinary number of remedies have been suggested, and tried, with *various* success: nor can such diversity of effects appear surprising, if the difficulty of expelling the tape-worm be considered; as, in the attempt, *portions* are frequently broken off and discharged: Nature having endowed this monster with a power of regeneration, it soon acquires its former size, and excites the same turbulent motions, We shall, therefore, state only those remedies which *appear* to be the most efficacious.

1. The celebrated specific of Mad. NOUFFER, was purchased, and published, by the King of France.....[For a notice of which See FERN.]

2. The method of carrying off the tape-worm, recommended by HERRENSCHWANDT, is as follows: The patient must swallow *one dram* of the male fern two successive mornings, before breakfast; and, in the evening, two hours after a light supper. On the third morning, the following powder is likewise to be taken before breakfast, and followed by large potions of weak tea: Take of purified gamboge, 12 grains; salt of wormwood 20 grains, and STARKEY's soap (a composition of distilled oil and fixed vegetable alkali) 2 grains; the whole to be duly incorporat-

ed: three hours after, 1 oz. of castor-oil is to be swallowed in a cup of beef-tea, and repeated once or twice at similar intervals. If the worm be still retained, a clyster, consisting of equal parts of milk and water, with 3 oz. of castor-oil is to be swallowed in a cup of beef-tea, and repeated once or twice at similar intervals. If the worm be still retained, a clyster, consisting of equal parts of milk and water, with 3 oz. of castor-oil, must be injected in the evening, which is generally productive of the desired effect.

3. The last of these *specifics* (as they are vainly styled), is that which MATHIEU, an apothecary of Berlin, lately asserted to have discovered; and for which the present king of Prussia honoured him with a title, and pension for life.

On reviewing these boasted remedies, it becomes evident that their principal efficacy is derived from the *male fern*, combined with various *drastic purgatives*; though it cannot be denied, that the auxiliary ingredients have, in some worm cases, proved equally successful. But all those drugs having been known to the medical world for centuries, it is to us a matter of surprize, that a man, like MATHIEU, should have the effrontery to offer this *cluster of vermifuges* as things of his own invention, and obtain from the royal hand, a gilt laurel, for which others have for past ages, toiled in vain! Nay, we are informed that, in a particular case, his pretended specific has also failed.....Quackery remains the same, whether covered with embroidered scarlet, or with rags.

Electricity has, likewise, been recommended for the removal of this troublesome inhabitant of the human body, especially after taking a brisk laxative in the morning....Physicians on the Continent have remarked, that in persons who had eaten a supper of strawberries, the tape-worm could be traced to different parts of the abdomen, by means of electric sparks drawn from a wooden point, and carefully directed to the body, so that it could afterwards be easily expelled.

Lastly, there is another efficacious method of exterminating this worm; and which has frequently been attended with the desired effect. Three or four days, previously to the use of opening medicines, from one to three tea-spoonfuls of a solution of tartarized antimony (2 grains in 4 oz. of water), is to be taken three times a-day: on the fourth day, a purging powder, composed of calomel and jalap, from 3 to 6 grains each, accordingly as the patient is moved with greater or less difficulty, must be administered before breakfast; but he should endeavour to check vomiting. In case this dose prove not sufficiently powerful, its operation may be promoted by the internal use and external application of castor-oil. During the passage of the worm, care must be taken not to interrupt its progress; as it has been observed, on the least irritation, either to return into the body, or to break off suddenly; in consequence of which, the whole complaint will be renewed: hence it would be advisable to sit on a vessel containing lukewarm milk, into which it may gradually descend; a practice that has often been attended with success.

TAPIOCA. See CASSAVA.

TAR, a thick, black, unctuous

matter, extracted from pit-coal, old PINE and FIR trees, by their combustion in a close, smothering heat.

[Under the article COAL, the famous coal tar, discovered by the earl of DUNDONALD, was mentioned, and the experience of our captain TRUXTON, and others, who had used it, was stated as unfavourable to its boasted superiority over vegetable tar, in defending the bottoms of vessels from the destructive West-India *teredo*, or gribble worm; but lord D. asserts, in his *Treatise on the Connexion of Agriculture with Chemistry*, that "its good effects have been manifold in repeated instances, and that it is entirely out of use for ship-bottoms and sheathing, on account of the *protection* it affords them from the worm, for at least thrice the time which vegetable tar defends them: and this reason, he says, was assigned for its disuse, by some of the most considerable and *candid* ship-builders on the Thames, and other parts of England. Vessels have performed six voyages to the West Indies with the same sheathing, when payed with the coal tar."

This positive declaration certainly demands attention; but still it may be asked, why does not the British government use it in the navy?

An experiment ought to be again made in the United States, on the efficacy of the application.

Tar contains a considerable portion of mucilage, which causes the tar to be dissolved in that fluid, against which it is intended to preserve them. Tar also contains an acid which injures the strength of the yarn. This acid, and this mucilage, may be easily separated by repeatedly boiling the tar in water, in the proportion of two or three times the quantity of water as of tar, until the tar nearly becomes thick enough for use. The tar may then be drawn off into a conical vessel, with its narrow end downward: at the bottom should be a cock, and another about a foot higher. Through the lower cock, the tar is to be drawn off while warm, and through the other the acidulous mucilaginous water may be let off. The tar thus purified, after pouring off the water, should be put into the tarring kettle, and after boiling a little time, it will throw off any water remaining mixed with it. Purified oils, (either animal or vegetable) or fats, must be mixed with this purified tar, any time of its boiling, and the quantity must be proportioned to the ductility wanted, or to the heat of the climate. For cold climates, whale-oil is to be preferred; and *fresh tallow* or *suet* in preference for warm climates. One tenth of suet or tallow is sufficient, but a greater proportion would be useful. For a more particular account of the utility of preparing tar as above, see the specification of Mr. CHAPMAN's patent, in the *Repertory of Arts*, vol. 2, new series, p. 91.]

Tar is an article of great utility, both in manufactures, and for various economical purposes: it likewise affords security to trees, from the ravages of hares, and other predatory animals: thus, if one part of tar be mixed with six or seven parts of grease, and the composition be laid on the bark with a brush, it will effectually defend plantations, and at the same time prevent the trees from being *bark-bound;* a disease that often oc-

curs, from the injudicious use of tar and lime. There are, however, some delicate shrubs, to which this mixture cannot be safely or conveniently applied: hence, it will be advisable to surround them with twine covered with tar; and, as this fluid is apt to loose its odour, on exposure to the air, it must be occasionally renewed.

Tar was formerly in great repute as a medicine, both in its original state, and also in infusions with water. It has been greatly recommended by Bishop BERKLEY, in the MURRAIN of cattle; and likewise in cold and phlegmatic habits of mankind; as it not only raises the pulse, and accelerates the circulation, but at the same time exhilerates the animal spirits. At present, however, tar-water is seldom employed; though it doubtless may, in some cases, be used with advantage; and especially in external applications for *stings*. Thus if a person stung by wasps, bees, &c. apply to the injured part a pledget dipped in such liquid, it will instantaneously mitigate acute pain, while it prevents swelling and other consequences.

TARE. See VETCH.

TARRAGON. See *Artemisia dracunculus*.

TARRAS, TERRAS, or TRAAS, a species of argillaceous earth, found in Germany, and Sweden, whence it is annually imported; being subject to the duty of 6½d. per bushel. It is of a pale-yellowish colour, containing numerous particles of spar, and other heterogeneous matters.

When reduced to powder, and mixed with water, terras forms a most *durable* cement or mortar which is advantageously employed for lining basons, cisterns, or other reservoirs.

In the 5th vol. of the *Transactions of the Society for the Encouragement of Arts*, &c. for 1787, we meet with a communication by Mr. MORE, stating that a species of *red earth* has been discovered in the parish of St. Elizabeth, Jamaica, which is an excellent substitute for tarras, in all buildings under water. Thus if one measure of such earth be mixed with an equal portion of sand, and a double quantity of well-slacked lime, the whole will form a cement, excellently adapted for constructing dams, bridges, or any other edifice in water; as it speedily hardens, and acquires the durability of stone.

TARTAR, a concrete saline matter, which separates from wines, after they have undergone complete fermentation: it adheres to the top and sides of the cask, in red or whitish-grey crystals, according to the colour of the liquor. In this state, it is called *crude tartar*; having a sub-acid taste, and being with difficulty soluble in water.

By repeated solution, filtration, and crystalization, crude tartar may be *depurated* or divested of all gross and impure particles, when it is called *crystals of tartar*; and, if these be reduced to powder, *cream of tartar*.

This salt is a mild, cooling and aperient medicine: if half or a whole ounce of it be taken in substance, with treacle, or any other vehicle, it proves an effectual purgative. Farther, when dissolved in water, it affords, with the addition of sugar, an agreeable acidulated drink, which is of great service in ardent fevers; and like-

wise forms a pleasant beverage during the summer.

TARTAR-EMETIC, or Tartarized Antimony, is prepared, according to the London College, by boiling in a glass vessel, 3 oz. of crocus of antimony, and 4 oz. of crystals of tartar, in 2 pints of distilled water, for about 15 minutes; when the solution should be filtered through paper, and the strained liquor kept in a cool place, in order to form crystals. This preparation is employed as an emetic, for which purpose it is far superior to any other composition of antimony; as it operates powerfully, without disordering the constitution.... When the full effect of an emetic is required, the dose varies from 2 to 4 grains; though it may be more advantageously administered in smaller quantities, as a nauseating and sudorific medicine. Dr. HUFELAND has observed, that one scruple of *starch*, combined with a single grain of emetic tartar, operates with greater speed, and certainty, than a full dose of the latter.

TASTE, in the animal economy, is one of the five senses, or that faculty which enables all organized beings to discern the various impressions produced by different substances on the tongue and the palate: thus we can distinguish sweet from bitter, and salt from acid.

The most certain method of preserving such useful sense, consists in adopting the strictest temperance, both with respect to food, and drink: in this manner, we may at all times not only partake with pleasure of our homely provision, but also relish with a superior degree of satisfaction the more luxurious dishes, that may occasionally be introduced at our tables.... At all events, it is one of the most humiliating sensations, which daily reminds us of our animal nature.

TEA-TREE, or *Thea*, L. a genus of shrubs consisting of [one] species.

[The different kinds met with, being only varieties, owing to the soil, culture of the plant, age of the leaves when gathered, and method of curing them. KAEMPFER long since asserted this fact, which has been confirmed by sir GEO. STAUNTON, in his account of Lord M'CARTNEY's embassy to China.]

The Tea-tree produces flowers similar to those of the DOG-ROSE, and which are succeeded by fruits of the size of sloes, two or three growing together:...it may be propagated in the temperate climates of Europe, as well as in the Indies, by setting the seeds in holes, about five inches deep, and at regular distances from each other. No particular care is requisite in its culture; but the ground must be cleared of weeds: at the expiration of three years, the leaves are fit to be gathered. Great pains are taken in collecting them *singly*, at three different times; namely, about the middle of February; in the beginning of March; and in April. Although some writers assert, that they are first exposed to the steam of boiling water, and then dried on *copper* plates; yet we understand from indubitable authority, that such leaves are simply dried on *iron* plates, suspended over a fire, till they become dry and shrivelled: when cool, they are packed in lead boxes, to exclude the air, and in that state exported to Europe. It is, however, remarkable that the fresh leaves of this shrub, when used for tea, oc-

casion giddiness, and stupefaction; which noxious properties are dissipated, by roasting them over a moderate fire. Nor is it advisable to drink infusions of this narcotic vegetable, till it be kept at least for 12 months.

Since the commencement of the 17th century, the consumption of tea-leaves has become so general, that, according to the most accurate calculations, there are at present 30 millions of pounds weight annually imported into Europe. Thus, we are every year drained of a sum of money which, if it were applied to the improvement of national agriculture, would support many thousand industrious families; by whose labour, during six weeks in the year, all the British empire might be provided with *native teas*. Nay, it is still more surprising, that though every intelligent mind will attest the truth of this remark, yet no landed proprietor, who is in any manner connected with commercial speculations, or who has the least interest in the affairs of India, will rise in a legislative capacity, with a view to remedy, or at least to check, this serious evil; an evil which, like a slow cancer, consumes the vital principle, and exhausts the best sources of a country.

As the Tea-tree grows principally between the 30th and 40th degrees of latitude, it might be easily raised in Europe: indeed, from the success with which plantations of this shrub have lately been established by a society of nuns in Franconia, near Wurzburg, there is great reason to believe, that it would also prosper in the southern counties of Britain, if proper attention were paid, till it become habituated to our climate. There are, besides, many indigenous vegetables that may be advantageously substituted; such are SAGE, BALM, PEPPERMINT, and similar spicy plants; the flowers of the Sweet WOODROOF; those of the Burnet, or Pimpernel ROSE; the leaves of PEACH and ALMOND-trees; the young and tender leaves of BILBERRY, and Common RASPBERRY; and, lastly, the blossoms of the Black-thorn, or SLOE-TREE; most of which, when carefully gathered, and dried in the shade (especially if they be managed like Indian tea-leaves), can with difficulty be distinguished from the foreign teas, and are at the same time of superior flavour and salubrity.

[The late Rev. Dr. MATTHEW WILSON, of Lewis, in Delaware, who was a learned divine, an excellent physician, as well as a firm patriot, endeavoured to reconcile the Americans to the loss of their favourite infusions at the beginning of the revolutionary war, by pointing out the evil effects which a constant use of tea, produce in the system; and proposed a number of substitutes, chiefly from among our native vegetables. The following are in the list.

1. Sassafras root, sliced thin and dried, with raspings of lignum vitæ. This, when drank weak is pleasant, and clears the complexion.

2. Sweet marjoram, and a little mint, relieves the head and nerves, and strengthens the stomach.

3. Dry sage and green balm leaves are astringent, stimulating and strengthning.

4. Rosemary and lavender, excellent for disorders in the head.

5. A few small twigs of white-oak, well dried in the sun, with

two leaves of sweet myrtle: this is so good a counterfeit of true tea, that good judges might mistake them.

6. Fennel seed, and inner bark of magnolia, (spicewood) is a powerful remedy against agues and hysterics. For the paper containing a list of substitutes at length, the reader is referred to AIKIN's *Pennsylvania Magazine* for 1775.

It is probable that at the present day, but few of the above substitutes will be used for Chinese tea, and yet considering the *immense sums* in dollars, which are annually sent out of the country for this article, it is sincerely to be wished that some substitute could be generally adopted. For by an official statement, it appears, that the amount of teas which paid duties, after deducting the exportations from the importations, for each year, of the years 1791 to 1800, were, 28,000,184lbs. The average duty is 16 cents per pound.

There can be no doubt of the climate of some part of the United States, being as favourable for the tea plant, as the climates of China or Japan, and the Americans who visit China, would render a service to their country, by introducing the plant.]

Teas are divided, in Britain, into three kinds of *green*, and five of BOHEA. The former class includes, 1. *Imperial*, or *Bloom* Tea, having a large leaf, a faint smell, and being of a light-green colour: 2. *Hyson*, which has small curled leaves, of a green shade, inclining to blue: and 3. *Singlo* Tea, thus termed from the place where it is cultivated. The Boheas comprehend: 1. Souchong, which, on infusion, imparts a yellowish-green colour. [The *Padre* Souchong, has a finer taste and smell than the common sort.] 2. *Cambo*, a fine tea, emitting a fragrant violet smell, and yielding a pale shade: it receives its name from the province where it is reared. 3. *Pekoe* Tea, is known by the small white flowers that are mixed with it. 4. *Congo*, has a larger leaf than the preceding variety, and yields a deeper tint to water: and 5. *Common* Bohea, the leaves of which are of an uniform, green colour. There are, besides, other kinds of tea, sold under the names of *Gunpowder-Tea*, &c. which differ from the preceding, only in the minuteness of their leaves, and being dried with additional care.

Much has been said and written on the medicinal properties of tea: in its natural state, it is doubtless a *narcotic*, or stupefying plant; on which account, even the Chinese refrain from its use, till it has been divested of this property by the processes above described. If, however, *good* tea be drunk in moderate quantities, with sufficient milk and sugar, it invigorates the system, and produces a temporary exhileration; but, when taken too copiously, it is apt to occasion weakness, tremor, palsies, and various other symptoms, similar to those arising from narcotic plants; while it doubtless contributes to aggravate the hysteric and hypochondriacal complaints, which now very generally prevail in both sexes. This drug has, farther, been supposed to possess considerable diuretic and sudorific virtues; which, however depend more on the *quantity* of warm water employed as a vehicle, than the quality of the tea itself. Lastly, as infusions of these leaves are the safest refreshment after undergoing great

bodily fatigue, or mental exertion, they afford an agreeable beverage to those who are exposed to cold weather; at the same time tending to support and promote that perspiration which is otherwise liable to be impeded.

TEASEL, or *Dipsacus*, L. a genus of plants exhibiting five species: three are indigenous; but the principal is the *fullonum* (more properly *sativus*), Manured, or Fuller's Teasel. It is raised from seed, which must be scattered on ridges, 7 or 10 inches apart, in the proportion of two pecks per acre. The most proper season for its propagation, is the month of April: the soil ought to be a strong, rich clay, or, what agriculturists term, a *good wheat land*. The young plants should be carefully weeded; and, if they grow too closely together, it will be proper to thin them, to the distance of one foot. In the spring of the second year, the teasels must be earthed up; and, in the succeeding month of July, the heads will begin to flower. In August, as soon as the blossoms decay, such heads must be cut off, and exposed daily to the sun, till they become completely dry; care being taken to shelter them from rain.

The teasel is an article of considerable importance to clothiers, who employ the crooked awns of the heads, for raising the knap on woollen cloths. For this purpose, they are fixed round the periphery of a large broad wheel; against which the cloth is held, while the machine is turned. Lastly, the blossoms of the teasel supply bees with honey; and the water, which collects within the cavities of leaves grown together, is said to be an useful application to weak or inflamed eyes; and likewise to afford a harmless cosmetic for removing spots from the face.

TEETH, a set of bones, situated in the upper and lower jaws, for the purpose of mastication: in adults, there are 32 in number, or 16 in each jaw-bone.

The teeth are of various size, being arranged in the following order: *four* in the front, termed cutting teeth, on each side of which is a sharp-pointed, canine, or *eye-tooth*; adjoining to these are *five* grinders on each side, the last of which is denominated the tooth of wisdom; because it seldom appears before the 25th year. The front and eye-teeth are furnished with only one root each; the two first grinders with two; and the hindmost generally with three or four; which may in most persons be ascertained by the number of small tubercles on the crowns.

The tooth is divided into two principal parts; namely, the *crown*, which projects above the gums; and the *root*, that is inclosed within the sockets: the crown is a hard, fine, glossy, white *enamel*, serving to defend the substance against external injury: the root is open at the bottom, where it is connected with vessels and nerves, by which it received nourishment, life, and sensation.

As an account of the manner in which the teeth are formed, may prove interesting to reflecting readers, we shall proceed to state concisely the process of *dentition*, or teething; and conclude with a short analysis of the *diseases* to which these useful bones are frequently liable.

In an embryo of 3 or 4 months formation, instead of the sockets, small cells are observable: these

are separated by thin membranes, each of which progressively exhibits a vascular bag, containing a soft knob, that is covered by the rising tooth, forming a hard coat; but the enamel appears to originate from crystallized matter..... During the first year, the two middle front teeth in the under jaw, and shortly after, the two upper ones, become visible: they are succeeded by the foremost front teeth. In the commencement of the second year, the first grinder, on each side, grows successively in the under and upper jaws: the next in rotation, are the canine or corner teeth, and finally, about the third year, there rise from two to three grinders on each side. About the seventh year, all these teeth are, by an effort of Nature, gradually replaced by a new set, to which are joined, in the tenth or eleventh year, another grinder, and, at a later period, the tooth of wisdom.

During the progress of dentition, children are subject to various affections, such as convulsions, inflammation, fever, &c. occasioned by the pressure of the teeth, in bursting through the gums. At this period, a moderate looseness, or a copious flow of saliva are, in general, favourable signs. With a view to promote the latter, it will be advisahle to let the child chew or gnaw such substances, as have a tendency to mollify the gums, and, by their pressure, to facilitate the protrusion; for which purpose a piece of liquorice or marshmallow root, &c. will he of service; or, the gums may be softened and relaxed, by rubbing them with sweet oil, honey, or other emollients..... Costiveness should be removed by mild aperient clysters. If, however, all these endeavours prove ineffectual, relief has often been derived from an incision made in the gum; though such operation should be undertaken only by the surgeon. In cases of extreme weakness, the application of blisters behind the ears, or to the back, will prove beneficial; and, as distressing symptoms frequently arise from crudities and obstructions in the first passages, it will be necesssary to attend to this circumstance: thus, if the child be troubled with acidity and flatulence, the testaceous powder, or calcined magnesia with a few grains of rhubarb, mixed with powder of sweet fennel-seeds, will form a very useful remedy; or, when worms torment the infant, the means suggested under that article, should be speedily adopted. On this occasion, we deem it our duty, in the strongest terms to caution parents against the use of laudanum, and other *composing* medicines, especially when the bowels are obstructed.

With respect to the *diseases* of the teeth, we shall, in this place, mention only such as occur more frequently, and which are, by proper attention, or by external applications, easily removed....From a view of the nature and formation of the teeth, it must be evident, that whatever may tend to remove the enamel, for instance, *acrid* dentrifices and tinctures, hard metallic tooth-picks, sudden changes from heat to cold (especially in taking food), by exposing the nerve, cannot fail to produce the *tooth-ach;* and, in the course of time, a *decay* of the bone itself. There are even instances, where such corruption, unless timely checked, has extended its influence to the jaw-bone. Nothing,

however, contributes to injure them more certainly than uncleanliness; by which a kind of tartar is generated, that settles on the teeth, and separates them from the gums: thus, the air and the food coming into immediate contact with the bony substance, will prove a never-failing source of pain and distress.

Cure:....As it would be a vain attempt to point out any *specific*, by which the tooth-ach can be removed, we shall recommend only such remedies as are adapted to the several causes, from which it may originate....If the patient be of a plethoric habit, or the gums be considerably inflamed, recourse should be had to bleeding, particularly by leeches and cupping-glasses, applied contiguously to the part affected: next, blisters behind the ears, or on the nape of the neck, will be found of service. Dr. CULLEN recommends vitriolic æther to be dropped on the cheek, and to hold the hand on the part, till that volatile liquor be evaporated. Should, however, the pain still continue, without intermission, a few drops of laudanum on cotton, laid on the tooth, will sometimes afford relief. Where the bone is hollow, and decayed, it will be advisable either to have it drawn by an able dentist, or to resort to such substances as destroy the nerve: the latter object may be effected by a careful application of the strong mineral acids, juniper-oil, or by a red-hot wire; but this operation, which has frequently produced the desired effect, ought never to be entrusted to an unskilful person.....As the tooth-ach, is frequently induced by cold, and attended with symptoms of CATARRH, it will in such cases be requisite to follow the directions given in that article. This complaint, likewise, often proceeds from affections or debility of the stomach; a source which may be ascertained by the symptoms of indigestion, such as loss of appetite, nausea, vomiting, and head-ach, with this peculiar circumstance, that the pain generally returns at regular periods. In such case, relief can only be expected from a proper use of emetics, and mild aperients, succeded by a judicious course of the Peruvian bark, and similar tonics.

Another source of these affections, is an irregular disposition, or arrangement, especially of the front teeth, and mostly in the second set. It may proceed either from some of the first set having been suffered to remain in the jaw, after the second has appeared; from a want of space in the jaw-bone; or from mal-conformation. In these cases, the only effectual remedy is that of extracting such of the teeth, as by their situation obstruct their neighbours, and sometimes occasion considerable distress.

If the teeth should be loosened by external violence, they may again be fixed, by pressing them firmly into the sockets, and preserving them in that situation, either by a silk, or other ligature attached to the adjoining tooth:.... the patient, however, ought to subsist entirely on spoon-meat, or other soft and liquid food, till the desired effect be attained. But, where this separation arises from a sponginess or weakness in the gums, mild astringents, for instance, a solution of alum and su-

gar, tincture of bark, catechu, &c. will serve to consolidate the surrounding parts.

For *cleansing* and *preserving* the teeth, burnt bread, or bark, applied by the small finger, or on a piece of calico, will be found a safe and useful dentrifice.....Lord DUNDONALD recommends, for this purpose, a weak solution of SODA.

Lastly, in cases where a *substitution of artificial teeth* should be deemed necessary, these useful bones ought to be manufactured from the tooth of the *Hippopotamus*, or river-horse; and on no account whatever to be taken from other persons. There are instances on medical record, where the latter practice has communicated infectious diseases, and eventually proved fatal.

TELESCOPE, one of the most useful optical instruments, consisting of a long tube furnished with several glasses, for the purpose of viewing distant objects.... This term is mostly applied to the larger kinds of telescopes; the smaller ones being called *perspective-glasses*, *spy-glasses*, *opera-glasses*; and a particular species, which is much brighter than any other, is known under the name of *night-glasses*.

Telescopes are of extensive utility, both in naval and military pursuits, but especially for contemplating the celestial bodies: hence the merit and honour of their original invention have been claimed by many ingenious men. According to the most accurate accounts, however the authentic contriver was ZACHARIAS JANSEN, a Dutchman, who produced his first instrument in the year 1590. Since that period various improvements and additions have been made by GALILEO, KEPLER, HUYGENS, MERSENNUS, GREGORY, SHORT, RAMSDEN, DOLLOND, ADAMS, and numerous other philosophers and artists. The most important are, those accomplished by Dr. HERSCHEL, whose grand instrument, when furnished with proper glasses, magnifies upwards of *six thousand* times.

It would be incompatible with our plan, to enter into the *rationale*, or an account of the principles on which telescopes are in general constructed. We shall, therefore, only remark, that a complete description of the machinery of Dr. H.'s noble instrument is inserted in the *Philosophical Transactions of the Royal Society*, Part ii. for 1795;.....and we shall proceed to state the principal patents which have been granted to different individuals.

The first, within our knowledge deserving notice, is that obtained in April, 1791, by Mr. ROBERT BLAIR, for his method of improving refracting telescopes, and other dioptrical instruments; which is fully detailed in the 7th vol. of the *Repertory of the Arts*, &c.

In January, 1799, a privilege was granted to Mr. CATER RAND, for an improved military and naval telescope, serving to ascertain distances, &c. at sight, by means of a new micrometrical adjustment. His instruments are made refracting, achroamatical, or reflecting; and the micrometer is furnished with four parallel wires, fitted to brass, silver, or other metallic, converging and diverging, plates, together with other machinery; the whole of which is so arranged, that the intermediate distance between two un-

known places may, together with the height or size of such distance, be easily ascertained.....A full specification of this ingenious contrivance is inserted in the 12th vol. of the work above quoted, where it is illustrated by an engraving.

The last patent we shall mention, is that procured by Mr. DUDLEY ADAMS, in May, 1800: for his invention of a mode of rendering telescopes, and other optical glasses, more portable. This useful object is effected by employing certain springs, which are so contrived as to occupy the least possible space, while they render the instrument to which they may be applied, strong and steady, on being drawn out: and, in order that the several glasses may acquire their true positions or distances, when such joints or tubes are drawn out, he has invented certain *flaunches*, for fixing and retaining them in every situation, in which an observer might find it necessary to place them. For a minute account, the curious reader is referred to the 15th vol. of the *Repertory of Arts*, &c. where the patentee's improvements are exemplified by a plate.

TEMPERANCE, strictly speaking, denotes the virtuous practice of those, who restrain their sensual appetites: it is, however, generally used to express *moderation*, in which sense it is indiscriminately applied to all the passions.

Temperance has been justly termed the virtue which bridles the inordinate desires: it is, indeed, closely connected with prudence and justice. It silences calumny, and substitutes extenuation for slander; expels avarice from the bosom; and thus demonstrates that true happiness consists not in contemplating useless wealth, or indulging in ambitious pursuits, or in the gratification of a vitiated palate; but in a contented mind. The votary of temperance views with equal disgust, the sallies of unjust resentment, and those of riotous mirth: he beholds the melancholy consequences of *intemperance*; learns to extinguish revenge, and every desire which humiliates a rational agent; thus proving that such virtue is the parent of many others, while it is attended with peace, prosperity, health, and satisfaction.

Without expatiating on this topic, let it suffice to observe, that it is a duty incumbent on all parents, to rear their children with a strict regard to *temperance*; as, by adhering to this rule only, they are entitled to enjoy either *health* or *longevity*. Those of our readers, who are desirous of farther information on this interesting subject, will meet with judicious hints in Mr. NELSON's *Essay on the Government of Children*, &c. (8vo. 5*s*. Dodsley); and particularly in Dr. HARWOOD's little tract, entitled, "*Of Temperance and Intemperance*," &c. (8vo. 2*s*. 6*d*. Becket, 1774): in which their effects on the body and mind, and their influence in prolonging or shortening human life, are discussed in clear, energetic language; and confirmed by examples.

TEMPERING. See CASE-HARDENING, and STEEL.

TENDONS, or SINEWS, in the animal frame, are ligaments, by which the motion of the joints is performed.

The principal affections of tendinous parts, proceed from exter-

nal violence, by which they may be wounded or lacerated. In these cases, surgical assistance ought to be immediately procured; otherwise, inflammation, fever, and even death, may be the consequence. If a tendon be partly divided, a few drops of Peruvian balsam poured into the wound, will be found an excellent remedy. But the principal relief in wounded or ruptured sinews, will be derived from keeping the limb in such a posture as to relax the muscles, and thus to facilitate the re-union of the injured part; after which, a proper bandage of fine soft flannel should be tightly passed round the limb, in order that the muscles may be retained in a state of ease, till a complete cure be accomplished.

A swelling sometimes appears on the tendons, particularly those of the wrist and ankle, where it is called *ganglion*. Such tumors are of an elastic nature, moveable, and generally arise from external injury, rheumatism, &c.: in many instances, they spontaneously disappear; but in the contrary case, friction, and gentle compression, by means of a thin plate of lead, secured by a proper bandage, will generally be sufficient to remove them. Should this treatment, however, not prove efficacious or an inflammation of the part ensue, it will be advisable *not* to neglect surgical aid.

TENNIS, a play requiring muscular exertions, and at which a ball is driven, by means of a racket.

This game is of French origin, and was introduced into Britain in the 17th century: it is performed in a long court, denominated a *tennis-court*, across which a net is suspended: through the latter, the ball is stricken by a racket; and, accordingly as it is driven into certain galleries, the game is lost or won.

Tennis is played by sets, each of which comprehends six games; but, if an *advantage-set* be proposed, 7 successive games must be obtained, by one or other party....As, however, our limits will not permit us to enter into particulars, the inquisitive reader may consult Mr. HOYLE's "*Games Improved*," by Mr. BEAUFORT (12mo. 3*s*.), in which the rules of *tennis* are fully explained.

TERRA JAPONICA. See CATECHU.

TERRIER, or *Canis terrarius*, a variety of the dog-kind, which is of different colours, being sometimes spotted, though generally of a liver, or black hue: its body seldom exceeds 18 inches in length, and the head is embellished with short, smooth, pendent ears.

Terriers are very useful to agriculturists, especially for exterminating rats, pole-cats, and similar depredators. Farther, these animals are remarkable for their vigilance, and are therefore frequently employed as *house-dogs*; but their principal services consist in hunting badgers, foxes, rabbits, and other quadrupeds which burrow under ground; because they enter the holes of such wild creatures, and either kill or draw them out of their hiding-places......An account of the disease to which terries are liable, the reader will find in the article DOG.

[TETRAO, a genus of birds, comprehending several species, 3 of which are natives of the United States.

1. The GROUS: *Le Gelinotte-hupee de l'Amerique*, of BRISSON.

Pinnated Grous, of LATHAM and PENNANT.

These birds abound in the lower part of the state of New-Jersey, and on the bushy plains of Long-Island, state of New-York. The male crows for half an hour about day-light, and at that time erects his wing-like feathers, which commonly hang on each side of the neck. They breed in July: their chief food consists of huckleberries, and acorns of the dwarf oak. In the winter season, they resort to the pines. The female is smaller than the male, less bright in colour, and is without the wing-feathers on the neck.

2. *Tetrao Tympanistes*, L. The ruffed heath cock, or pheasant of Pennsylvania. A common bird throughout all North America.

The male has a ruff on each side of the neck, which he raises at pleasure. The head is crested, the general plumage is brown, inclined to the rusty on the back, prettily varied with black. The black on the ruff is disposed in broad black bars. The under part of the bird, is light with large brown bars. The tail is large and expansible like a fan, in some of an ash, in others of an orange colour. The feet are feathered, toes pectinated.

The female is without ruff and crest; the plumage in general is like the male.

These birds are remarkable for a practice of clapping their wings, against their sides, in the mornings and evenings of spring and autumn. They swell their breasts like the pouting pigeon, and with their wings, make a noise not unlike a drum in sound, and shortning each sounding note till they run one into another undistinguishably, like two empty bottles striking together. They are particularly fond, of the buds and leaves of laurel, (*Kalmia latifolia,*) which when eaten late in the winter, communicate a poisonous quality to the flesh :....See KALMIA.]

TETTERS. See RINGWORM.

THEATRE, signifies the place in which spectacles, or dramatic representations, are exhibited.

The drama was originally invented in Greece; whence the rules of it have been gradually dispersed over the civilized nations of Europe. It would, however, be inconsistent with our limits, to trace its progress from rudeness to refinement, or *vice versa:* we shall, therefore, content ourselves with remarking, that dramatic performances afford to many persons an agreeable relaxation, after the toils of their industrious pursuits. And, though play-houses have often met with violent opposition, as tending to corrupt the morals of the people; yet, if they be managed with a due regard to decorum, and moral truth, inculcating only virtuous precepts, they doubtless deserve encouragement. Indeed, the tendency of *plays* depends principally on the opinions, manners, and taste of the public: for, as the chief object of those who devote themselves to the stage, is the acquisition of wealth and fame, or notoriety, it follows that if such taste be gross or corrupted, the representations will also partake of the general depravity, in order to please a *mixed* audience: on the other hand, if the national sentiments be elevated and refined, the performances will likewise be divested of rude and licentious expressions; so that the theatre will then be fa-

vourable to the cause of virtue and morality.

As the language of the drama ought to be alike free from affectation and ambiguity, we think it highly censurable in performers, either to extemporize, where a favourable opportunity offers for *passing off a vulgar joke;* or to substitute words, the meaning of which admits of an explanation unfavourable to moral purity. It would be superfluous to point out the danger of such licentiousness, especially to the young female breast, which is thus imperceptibly contaminated in the presence of parents and guardians. Nor can *we* approve of another singular custom, now prevalent in our theatres; namely, that of accompanying the most serious drama, or a tragedy, with what is vulgarly called an *entertainment*, or a *farce:* thus, every grain of taste in the audience, is completely effaced; and it appears to us nearly in the same light, as if a person, after hearing an impressive discourse, retires to an adjoining tavern, in order to drown the calls of conscience, by profuse libations to Bacchus.

THERMOMETER, or THERMOSCOPE, an instrument for measuring, with accuracy the degrees of heat or cold in the air, water, &c.....It is probable, that the expansion and contraction of bodies, in consequence of heat and cold, afforded the first idea for the contrivance of this useful scale.

The thermometer was invented early in the 17th century; and, on account of its extensive service in the arts, manufactures, and domestic life, the original merit of constructing this valuable instrument is variously attributed to CORNELIUS DREBBEL, PAUL SARPI, GALILEO, and SANCTORIO; though, we believe, the person first mentioned, deserves the credit of having invented the earliest thermoscope, in the year 1638, at Alkmaar, in North Holland. It was, however, an imperfect attempt; being regulated solely by the expansion of the air; and serving at the same time as a BAROMETER; for his tube contained a mixture of water and aqua-fortis. Hence it was, in its primary state, called an *air-thermometer;* and, after substituting various other liquids, which were adopted by the Florentine Academy, by Sir ISAAC NEWTON, and other philosophers, but, which, on account of their uncertain properties, have long been disused, Dr. HALLEY proposed, in the year 1680, to employ quicksilver for this important purpose. DANIEL GABRIEL FAHRENHEIT, a native of Dantzig, was the first who successfully availed himself of that suggestion, in 1709; when he produced his newly *graduated tube*, containing the mercurial fluid...... He ascertained the *artificial freezing point* in the same year, during the severe winter; by observing, that a mixture of snow and sal-ammoniac, uniformly caused spirit of wine to descend to the point marked, and no farther.....Hence, he was induced to denote such part of his cylindrical tube with O or *zero;* from this point to that of the usual temperature of the human body in a healthy state, he divided the intermediate space into 96 degrees; and thence to that of *boiling water* into 126°, so that the latter mark, in his scale, rises exactly to 212°. Thus, FAHRENHEIT claims not only the merit of having introduced the most scientific and con-

venient division of the thermometrical scale, but also that of adopting the mercurial fluid, which is doubtless the most proper, and perhaps the only one furnished by Nature, for measuring the various degrees of heat and cold, in the most accurate and sensible manner.....M. De Luc has proved, by conclusive arguments, the superiority of thermometers supplied with mercury, over those containing alkohol; and that the rising of the mercury, at all seasons, very nearly corresponds with the increase of heat. On the other hand, De Serviere remarked, that the column of mercury, in a perpendicular thermometer, tends to impede the accurate motion of this metallic fluid, on account of its own specific gravity: hence, he has judiciously proposed to remedy such defect, by keeping the instrument in a horizontal position.

M. De Reaumur, in 1730, proposed a new division of the thermometrical scale, by introducing 1000 parts of diluted spirits of wine into his tube with the usual globe, then commencing to count from 6 upwards, to the boiling point, which he marked with 80°. Such contrivance, however, having been found inconvenient for calculating the different degrees of heat and cold, with sufficient accuracy, Reaumur's globes, with their tubes, were subsequently also furnished with mercury; and are at present chiefly employed by the French, and in some parts of Germany.....To enable the reader to form a distinct idea of the difference subsisting between the two instruments, here described, we shall subjoin a comparative table of their scales.

[Above the o (zero) of Reaumur, or 32° of Fahrenheit.			Below the o (zero) of Reaumur.		
Reaum.	*Fahren.*	$\overline{10}$	*Reaum.*	*Fahren.*	$\overline{10}$
o	32		o	32	
1	34	2	1	29	8
2	36	5	2	27	5
3	38	6	3	25	2
4	41		4	23	
5	43	3	5	20	8
6	45	5	6	18	5
7	47	7	7	16	2
8	50		8	14	
9	52	5	9	11	8
10	54	8	10	9	5
11	56	8	11	7	2
12	59		12	5	
13	61	2	13	2	8
14	63	5	14	5	
15	65	8	15	o 1	8
16	68		16	4	
17	70	3	17	6	2
18	72	5	18	8	5
19	74	7	19	10	8
20	77		20	13	
21	79	2			
22	81	5			
23	83	8			
24	86				
25	88	2			
26	90	5			
27	92	7			
28	95				
29	97	2			

In the above mode, the scale may be continued above or below the freezing point.

The manner of computation in Reaumur's, as well as in Fahrenheit's thermometer, is by decimals, every degree being divided into 10 parts; but for their respective gradation, 32 degrees of Fahrenheit's thermometer must be considered as corresponding with o in Reaumur's; and each degree of Reaumur's, either above or below o, be counted as equal to two degrees and a quarter of Fahrenheit's.

So, four degrees below o of REAUMUR's correspond with 23 degrees in FAHRENHEIT's; as four degrees above o in REAUMUR's likewise correspond with 41 degrees of FAHRENHEIT's; and so, fractionally, in the same proportions, either above or below.

Hence, to *reduce* REAUMUR to FAHRENHEIT, the *rule* is, multiply the degrees of R. by nine, divide the product by four, add 32 to the quotient, and the sum will give the degree on F.'s scale....And to *reduce* F. to R.....From the degrees of F. subtract 32, multiply the remainder by four, and divide the product by nine, the quotient will be the degree of REAUMUR.

The thermometer may be applied to the important purpose of discovering the nearness of a ship to a shoal, coast, bank, rocks under water, and islands of ice, at night, in fogs, and when the weather is too boisterous to sound. Mr. JONATHAN WILLIAMS has published an interesting paper on the subject, in 3d vol. of the *Trans. Amer. Phil. Society*, from which the following is extracted.

" In the months of August and September, 1785, I was a fellow-passenger with the late Doctor FRANKLIN from Europe to America, and made, under his direction, the experiments mentioned in his description of the course of the gulph stream, an account of which was annexed to his maritime observations, and published in the *Amer. Phil. Transactions*, vol. ii. page 328, I then determined to repeat these experiments in my future voyages. Accordingly on a passage from Boston to Virginia, in October 1789, I kept a journal of the heat of the air and water at sunrise, noon and sunset; I then noticed that the sea water, out of soundings, was about 10 degrees warmer than that on the coast, and it very naturally occurred to me that the thermometer might become an useful nautical instrument to indicate an approach to the shore. I thought it prudent, however, to keep this idea to myself till after I had made a course of fair and repeated experiments, which I accordingly did during four passages, first, the one from Boston to Virginia abovementioned, second from Virginia to England, third, from England to Hallifax, and fourth, from Hallifax to New-York. By consulting these journals and observations, made at the dates written, together with the tracks of the ship's way, marked in a chart given in the 3d vol. *Amer. Phil. Trans.* p. 84. it will not only appear that Dr. FRANKLIN's account of the *warmth* of the *gulph stream* has been amply confirmed, but also that banks, coasts, islands of ice, and rocks under water, may be discovered when not visible, and when the weather is too boisterous to sound, with no other trouble than dipping the thermometer into the sea water. It is well known to sailors, that the *water* on the *banks* of *Newfoundland* is *cold*, but as they only try this, with the hand, their remarks are contradictory owing to the varied temperature of the hand, and I never heard of any further application of what they thought a matter of curiosity. Dr. FRANKLIN's observations had the knowledge of currents for their object, and this extension of his discovery did not occur; but as I am indebted to his instructive conversation and example, for my inducement to pursue philosophical researches, when in my power to

do so, he may be considered as the original author of what is now presented for examination.

"It may not be amiss to state such facts as it is presumed the experiments have a tendency to establish.

1. The water over *banks* is much colder than the water of the main ocean, and is more cold in proportion as it is less deep.

"2. The water over small banks is less cold than that over large ones.

"3. The water over banks that are near the coast is warmer than that over banks far distant, but it is colder than the adjacent sea.

"4. The water over banks of the coast, *i. e.* those immediately connected with the land above water, is warmer than that over those which admit deep water between them and the coast; but still it is colder than the adjacent sea.

"5. The water within *capes* and rivers does not follow the above rules; it being less agitated, and more exposed to the heat of the sun, and to receive the heat from the circumjacent land, must be colder or warmer than that in soundings without, according to the seasons, and temperature of the atmosphere.

"6. The passage, therefore, from deep to shoal water may be discovered by a regular use of the thermometer, before a navigator can see the land; but as the temperature is relative, no particular degree can be ascertained as a rule, and the judgment can only be guided by the difference. Thus, in August I found the water off Cape-Cod to be 58° of Fahrenheit, and at sea it was 69°; in October the water off Cape-Cod was 48°, and at sea it was 59°. This difference was equally a guide in both cases, though the heat was different at different seasons.

"I do not presume to say what is the cause of this difference of heat between the sea and bank water, but if a navigator were to observe it when near an island of ice, he would very naturally say that the ice conducted the heat from the circumjacent water, and left it colder than at a distance. And as it is well known that stones and sand are great conductors of heat, it seems probable that banks also conduct the heat from the adjacent water, though not so rapidly as the ice. The heat of the water may indeed be supposed to seek its equilibrium, but as long as the islands of ice and banks continue to conduct, there must be some difference, and this it is, which, by attention, may be made a faithful sentinel to give an alarm when danger is near.

"I have thought it my duty to present my journals as they were written at sea, to avoid the suspicion of having added any thing from the suggestions of the imagination. While this will be received as a circumstance favourable to the truth of them, I hope it will also operate as an apology for their many imperfections.

"My journal from Boston to Virginia, shows that the water on the coast of Massachusetts, was at 48°; at sea between that coast and the stream, 59°; in the gulph stream at its edge, 67°; between that, and the coast of Virginia farther southward, 64°; and in soundings on that coast, 56°. At that season (in October, just after the warm weather) the water grew warmer as we approached the land.

"My journal from Virginia to

England shows, that in December, the water on the coast of Virginia was at 47°; between the coast and the stream, 60°; and in the stream, 70°. This current being in our favour, we did not avoid it, and the water continued with little variation, till we came near the banks of Newfoundland, when the thermometer fell from 66 to 54; passing these, it rose again to 68°, and then continued a very gradual descent as we went to the northward, 'till we struck soundings, when it was at 48°.

" It may be here observed, that the decrease in the heat of the water was so gradual as to give but one degree in a day's run, while in going to, or coming from the coast of America, the thermometer will alter eight or 10 degrees in a few hours run. It is well known, by sounding, that the English coast extends with a very gradual descent to a great distance. It is also known that the American coast does not extend very far, and the water is suddenly deep.... Let these facts be compared with the changes in the thermometer, on the two coasts and they will agree with what has been said about the usefulness of that instrument.

" It may be observed in Doctor FRANKLIN's journal on board of the Reprisal, that in November 1776, when near the banks of Newfoundland, his thermometer fell 10 degrees, though considerably to the southward of them, and after passing them it rose nearly to its former state: the Doctor did not make any observation on this circumstance; but it agrees with my journal, in nearly the same place, made nine years afterwards.

" My journal from England to Hallifax, shows the changes in the heat of the water as we sailed over banks and deep water alternately, with an accuracy that I confess, exceeded my expectation, the land appearing as the thermometer indicated our approach to it.

" My journal from Hallifax to New-York not only shows the variety of depths we passed over, but indicates the inner edge of the gulph stream. As by the thermometer and soundings it appeared to me that the ship was a-head of the reckoning, I made allowances for the eddy current of that stream in our favour, and comparing these with the chart, I noted in the journal, the longitude I thought we were in, under that calculated by the ship's officers: what encouraged this opinion, was the disagreement between the soundings by the lead, and those marked on the chart, in the places where, by the common reckoning, the ship was supposed to be: while upon the other supposition they both agreed. When we made the land this latter reckoning turned out accurate, and I won a small bett of the Captain who candidly acknowledged the usefulness of the thermometer, and declared that he would in future always have one on board.

" Finding the coast of America to grow suddenly deep as it approaches the gulph stream, and finding continued soundings from Cape-Sable to New-York, I am induced to believe that it has its shape according to the course of that current, and that it is connected in a sweep from the banks of Newfoundland to Florida, the various banks being only eminences of the coast. If my apprehension of

the accuracy of thermometrical observation is well founded, it would be an easy thing to make a general survey of the coast under water, more particularly than has hitherto been done by sounding.

"On the chart annexed the tracks of my several passages are marked with the daily heat of the water in degrees according to FAHRENHEIT, by which the variations on the approach to land may be seen at one view. The edge of the gulph stream is also traced according to the experiments as far as the banks of Newfoundland: how far it runs to the eastward I do not pretend to say; but having found a current in the natural direction of its sweep among the western islands, I am inclined to think it extends so far, before it turns off to the southward. It may be observed, however, that as this stream, like all other currents, must be affected by storms on either side; it may, as these prevail, run somewhat nearer or somewhat farther distant from the coast.

Mr. WILLIAMS found by "some experiments on fish, that their animal heat was 16 colder than the water at the surface; from which it may be supposed that the water at bottom is in proportion colder than that above. It may be naturally suggested, that trying the heat of the water at the surface, (the only way in one's power when sailing rapidly through it,) is too inaccurate to be depended on, since the surface must be heated by the atmosphere. To this it may not be amiss to answer......1. That by repeated experiments at the depth of 30, 40, and 60 fathom I have found the water below, out of soundings, to be no more than six degrees colder than that above; and at four or five fathoms depth, when the sea was agitated, there was no difference worthy notice. 2. When the sea is not agitated, and the surface, by being exposed to a hot sun, is warmer, the weather being calm, it is easy to have water from a considerable depth; this I have found to make a difference of one or two degrees only, and it is easy to make the allowance. 3. The difference of heat which marks an approach to land is sufficiently sensible at the surface for the purpose of giving notice of danger, I have generally found it to be six degrees in three hours' run, and long before we were near enough to be in danger. Upon the whole, as it is fact, and not argument, which should inspire belief, I wish every doubting navigator to endeavour to confute me, by making other experiments, and thereby, if he can, detect the fallacy of mine."

Mr. WILLIAMS has given a chart of his different tracks alluded to in the above, which cannot fail to be highly interesting to navigators.

Mr. JOSEPH DONATH, of Philadelphia, by similar experiments in the winter of 1791, during a voyage to Hamburg, was led to the same conclusions, and communicated to the editor the following striking fact, to prove the very great importance of regular observations. On the eighth of May 1794, when on the banks of Newfoundland, the mercury in the thermometer, when immersed in the water, fell from nine to three, in the course of six hours, viz. from four, P. M. to 10 o'clock; at 12 at night it fell to 2.

The captain, alarmed at the cir-

cumstance, immediately awoke Mr. D. who, suspecting the diminution of temperature in the water, to proceed from the approach to islands of ice, advised the captain to stand off. He accordingly did so, and when day-light appeared, saw several islands of ice, distant about four or five miles. At ten o'clock, in 35 fathoms water, the mercury rose to six.

In July 1803, the British packet, Lady HOBART, during a dark night, ran foul of an island of ice, on the banks of Newfoundland, which occasioned the vessel to founder: had regular observations of the temperature of the ocean-water been taken, this awful accident might have been prevented.

The above interesting observations of Messrs. WILLIAMS and DONATH, are confirmed by Mr. STRICKLAND, (*Amer. Phil. Trans.* vol. 5.) and Mr. POYNTELL of Philad. during a late voyage from London to the United States; and should induce masters of vessels to keep a regular set of observations, especially when near land, in unknown parts, or on the banks of Newfoundland.]

It would be needless to describe the various thermometers invented during the last century; because the two instruments before mentioned have received almost universal sanction; few others being at present employed, either by artists or men of science. Hence we shall merely observe, that DE L'ISLE, at Petersburgh, contrived a new thermometer, in 1733, which is divided into 50°.....Prof. CHRISTIN, of Lyons, proposed a scale of 100 equal parts between the freezing and boiling points: this division was adopted by Prof. CELSIUS, in Upsala, whose improved scale, consisting of 100 exact degrees, is generally used in Sweden.

There are many other thermometers, among which, those of DUCREST of Geneva; by STROHMEYER and BRANDER, in Germany; by GRUBERT in France (who, together with the three preceding, contrived the *Universal Thermometer*, which contains the comparative scales of 28 different instruments); by DE LUC; RENALDINI; CAVENDISH; KONIGSDORFER; MUDGE; the BERNOULLIS'; FONTANA; ACHARD; LICHTENBERG; LANDRIANI; SAUSSURE; CASTELLI; and LUZ.

The first idea for constructing a metallic thermometer, or properly, *pyrometer*, was furnished by GRAHAM, and improved upon by MORTIMER, INGRAM, Count LOSER, FITZGERALD, FELTER, and at length brought to perfection by WEDGEWOOD. This ingenious manufacturer (of the finest earthenware from bassaltic masses, or *terra-cotta*) has rendered an essential service to society, by his method of ascertaining high degrees of heat: for this purpose he employs small cubes of dry clay; because that species of earth has the remarkable property of contracting in its bulk, when submitted to the fire, and not again expanding, on suddenly exposing it to the cold air. In order to ascertain the precise degree of heat in an oven, he puts one of his clay-cubes into it; and, after having acquired the temperature of the place, he immediately plunges it into cold water. Now, the size of the cube (that was exactly adjusted to half an inch square) is measured between two brass rules, the sides of which are somewhat obliquely disposed, so as to form an irregular groove, into which the cube may

be slidden. In proportion as the bulk of the latter has been contracted by heat, it passes down deeper between the scales, on which the various degrees of temperature have been previously marked. Thus, when the division of the scale commences from the point of red heat visible in day-light, and the whole range be divided into 240 equal parts, it will be found that Swedish copper melts at 28; gold at 32; iron at from 130 to 150 degrees: above this point, the cubes could not be heated. But, if one of these clay squares be put into an oven where other materials, such as bread, earthen-ware, &c. are to be baked, they may be usefully employed, for regulating the necessary degree of heat.

THIRST, is an uneasy sensation, which arises from a deficiency of saliva, for moistening the mouth, and lubricating the throat.

Thirst is generally occasioned by the use of strong, salted, or highly-seasoned food: a moderate degree contributes to the preservation of health; as it requires a certain proportion of drink, to promote digestion; but, if it become excessive, it is in most cases a symptom of fevers, dropsies, &c.

The most effectual way of alleviating thirst, will be the use of diluted vegetable acids; or the chewing of a crust of bread with a little water, which liquid may be gradually swallowed. Where this unpleasant sensation, however, is consequent on any disease, the removal of the latter together with the aid of diluent liquors adapted to its nature, and taken in small quantities, will also prevent the return of thirst. In other cases, where the use of acids or profuse draughts of diluents, might be productive of injury to the constitution, this complaint may sometimes be obviated, by chewing the root of the pellitory, or some similar substance, which excites and increases the flow of saliva. Lastly, as thirst is often the concomitant of excessive HUNGER, and may sometimes occur at sea, the adoption of the expedients pointed out in that article, will generally afford relief.

THISTLE, or *Carduus*, L. a genus of plants, comprising 38 species; 10 of which are indigenous; the following are the principal:

1. The *marianus*. See MILK-THISTLE.

2. The *lanceolatus*, or SPEAR-THISTLE, grows on rubbish, and road-sides, where it flowers in the months of July and August....According to Dr. WITHERING, this species vegetates on ground newly turned up, where no other weed will thrive: under the shelter it affords, new plants will speedily appear, and the whole become fertile. Its flowers, like those of the artichoke, possess the property of curdling milk. It is not relished by horses, cows, or goats; and is totally refused by sheep and swine.

3. The *acaulis*, or DWARF-THISTLE, thrives in mountainous and rocky, dry pastures; flowering in the month of July.....This species is perennial, and should be carefully extirpated; as it is exceedingly destructive to the herbage growing beneath its shade. It is wholly rejected by cows.

4. The *Benedictus*, or BLESSED THISTLE, is an annual exotic, cultivated in gardens: it flowers in the months of June and July, and produces ripe seeds in autumn..... Its leaves possess a penetrating bitter taste, and have an ungrate-

ful flavour which, by keeping them for some time, is mostly dissipated. A decoction of this nauseous plant is sometimes used to excite vomiting; and likewise a strong infusion, to promote the operation of other emetics. Good effects have occasionally been derived from the Blessed Thistle, in loss of appetite: or where the stomach was impaired by irregularities. A strong infusion, either in cold or warm water, drank freely, occasions a copious perspiration, and promotes the secretions.

All the species of this neglected vegetable, may be usefully employed for various purposes: thus, the seed-crowns of the thistle afford both a valuable material for manufacturing PAPER, and a kind of strong cloth; the ashes obtained by burning the whole plant, are of great service in glass-houses; and the young, tender, mealy stalks may be dressed, and eaten as substitutes for *asparagus*.

THISTLE, the COTTON, COMMON, ARGENTINE, or WOOLLY ONOPORDUM, *Onopordon Acanthium*, L. a native biennial, growing to the height of 6 feet, on rubbish, and road-sides, where it flowers in July. This vegetable is refused by cows, horses, and sheep: .....its expressed juice, was among the ancients reputed to be a specific in cancerous cases.....the receptacles or bases of the flower-cups, together with the stems, may be boiled and eaten like *artichokes*. ...The woolly substance enveloping the seed, is equally useful in the manufacture of cloth and PAPER, (see vol. iv. p. 225)......The seeds of this remarkable plant also promise great advantages to the industrious husbandman: we learn from DURANDE, a French writer, in the *Bibliotheque Physico-economique* vol. ii. p. 122, that he collected a number of the seed-crowns, weighing 22lbs. from which he obtained 12lbs. weight of seed; and, on expression, 3lbs. of excellent lamp-oil, greatly superior to that of linseed, and equal to olive-oil.

THISTLE, the SOW. See SOW-THISTLE.

THORN-APPLE, the COMMON, or *Datura Stramonium*, L. originally a native of America, but now indigenous in some parts of Britain, where it grows among rubbish, and on Dunghills; flowering in the month of July.

The seeds of this vegetable have always been classed among the violent narcotic poisons: though, according to Baron STORCK, and other German physicians, the inspissated juice of its leaves has, on the Continent, been successfully employed in maniacal cases: the dose is from one to ten grains, or upwards, to be taken in 24 hours.....It may likewise be administered internally, both in convulsive and epileptic affections. Dr. WITHERING observes, that an ointment prepared from the leaves, affords relief in external inflammations, and especially in the piles. [It is also highly beneficial in burns, and to allay the swelling of a cow's udder.]...Either the seeds or leaves, if swallowed by accident, occasion delirium, tremor, swelling, itching, insupportable thirst, palsy, and death: they likewise tend to inflame the skin. The most effectual antidotes will be, speedy emetics, followed by copious draughts of olive-oil and vinegar, aided by soap-clysters..... The thorn-apple is, nevertheless, eaten by cows, goats, and sheep; but refused by horses.

THRASHING, or THRESHING, in rural economy, is the operation, by which grain is separated from the straw.

Thrashing is performed by different methods, in various parts of the globe: thus, in the eastern climates, corn is trodden out by oxen, cows, horses, mules, and even by asses: while in Europe, the flail is generally employed.... This implement is certainly preferable to the feet of animals; as it is not only more expeditious, but the labour is executed in a much cleaner mode than can be effected by the latter. But, notwithstanding these advantages, thrashing with the flail, is liable to many objections; being too laborious, even for persons of considerable strength: and, as they are often paid in proportion to the quantity of corn thrashed, such work is seldom accomplished in a perfect manner; so that numerous grains generally remain in the straw. To remedy these inconveniencies, machines of various construction, have been invented; and, as some of these contrivances promise to be of great advantage to agriculturists, we shall give an account of the most valuable.

In Mr. Boys' *General View of the Agriculture of the County of Kent* (8vo. 4s. Nichol), we meet with an account of a thrashing-machine erected in a barn on his farm......as our limits will not permit us to describe its mechanism, we shall only remark, that it requires four horses, eight men, and four boys, to remove the corn from a distant part of the barn; to feed the mill; attend the winnowing-fan; and stack the straw. Thus, if the corn yield abundantly, the machine will thrash out *three* quarters of wheat, *four* of barley, or *five* of oats, within one hour, in a cleaner manner than can be effected by the usual mode; so that nearly *one-half* of the expence will be saved.

[Various other plans have been proposed for threshing machines in England, but they either have been so very expensive, that few could use them, or so complicated that they soon were put out of order: and the public is still undecided as to the superiority of any one. In the United States there have also been a few contrivances for threshing; the latest of which was invented by Mr. CHRISTOPHER HOXIE of Hudson, New York, and with some improvements, promises to be more perfect than any yet known.]

THRIFT, or *Statice*, L. a genus of plants comprising 22 species, 3 of which are indigenous: the following are the principal:

1. The *Limonium*. See LAVENDER-THRIFT.

2. The *Armeria*, COMMON THRIFT; SEA-GILLIFLOWER; or SEA-CUSHION, which is perennial; grows in meadows, and on rocks near the sea-coast; where it flowers in the months of May and June. When in full blossom, it presents a beautiful sight in pasture-grounds; on which account, it is likewise often planted in gardens, as an edging for borders.

The Sea-gilliflower forming whole swards, or tufts of grassy, solid, and smooth leaves, its culture is much recommended in loose sands, which are thus speedily consolidated: the naked stalk, in general, attains only the height of 6 inches. The plant is eaten by horses and goats, but refused by sheep.

THRIPS, a genus of insects comprising 11 species, that are variously named, according to the trees which they infest. These vermin are extremely minute; having a small slender body, and a rostrum, or beak, which is scarcely perceptible to the naked eye: they are very pernicious to fruit-trees, attacking both the leaves and fruit; but may be extirpated by resorting to the method already pointed out, vol. ii. p. 162.

THROAT, or the cavity behind the tongue and the curtain of the palate: the soft parts of which it is composed, are the common integuments and the muciparous glands. The principal use of these parts being destined to support and facilitate swallowing, breathing, speech, and hearing, it is obvious that all local affections, by which the exercise of these functions may be impeded, require serious attention. But, as most of the diseases to which they are liable, have already been discussed, we refer to their respective heads: thus, for inflammations in the throat, the reader will consult the articles QUINSY; SWALLOWING, and TONSILS.

THROAT-WORT. See Giant BELL-FLOWER.

THROSTLE, or THRUSH, *Turdus musicus*, L. a well-known British bird, which, in its melodious notes, is excelled only by the nightingale. Its head, back, and lesser coverts of the wings, are of a deep olive-brown; and the inner surface of the latter is yellow. The cheeks and throat are mottled with brown and white; the belly and breast are of a pale-yellow colour, with large black spots.

Throstles build their nests in some low bush or thicket: externally, they are composed of earth, moss, and straw, but the inside is curiously plastered with clay. Here the female deposits five or six pale-bluish green eggs, marked with dusky spots. The throstle is by some believed to be the finest singing bird in Britain, on account of the sweetness, variety, and continuance of its melody. From the top of high trees, it exercises its harmonious voice, and for the greater part of the year, amuses us with its song.

THRUSH, a disorder incident to infants, and of which the following are the principal symptoms: Small whitish or grey pustules appear on the fauces, extending over the surface of the tongue, and adjacent parts; the former is swoln, and the whole assumes a purplish colour: sometimes the pimples are scattered, and distinct, but generally confluent, adhering closely to the membranes: if rubbed off, they speedily grow again, and remain for an indefinite period.

This disease is not confined to the mouth and throat, but in some instances extends to the gullet, stomach, and alimentary canal; quantities of aphthous pustules having been vomited up, and also voided by stool: in these cases, however, the patient is commonly attacked with fever and anxiety, hiccough, and hoarseness.

The principal cause of this malady is a weak digestion, by which the milk becomes coagulated, and unfit for aliment; though it is frequently induced by cold and moisture. The thrush likewise occurs in the course of other disorders, or, in consequence of certain active medicines; but, under these circumstances, it cannot be considered as a primary affection, and most-

ly disappears, when the patient is in a convalescent state....The following conditions prognosticate a favourable event: namely, when there is neither fever nor looseness; the deglutition is easy; the appetite returned; and when the pustules are of a white colour.

Cure:....If the thrush be of a mild nature, it will in general be sufficient to administer the following powder to the *nurse*: Take of calcined magnesia, 1 oz.; orange-peel, sweet-fennel, and white sugar, finely pulverized, of each 2 drams; mix the whole, of which a tea-spoonful may be taken in water, twice or three times a-day:.... in obstinate cases, it will be advisable to give the child about a third or fourth part of the quantity prescribed for the nurse. During this treatment, the following composition should be applied, with a view to cleanse the mouth: 1 dram of pulverized borax, with 1 oz. of honey of roses. Where costiveness prevails, it will be preferable to regulate the bowels by mild emollient clysters, repeatedly injected, until the desired effect be produced; for, if the pustules should spread over a considerable part of the alimentary canal, laxatives taken by the mouth, are apt to increase the irritation, and to occasion copious stools, tinged with blood.

Where the nipple of the nurse is affected with the thrush, the following solution may be applied with advantage; namely, 2 scruples of borax dissolved in 1 oz. of elder-flower water, or tea, adding half an ounce of honey of roses: the nipples should be anointed with sweet-oil, before the infant is placed to the breast; in order to prevent immediate contact.

As, in some cases, the thrush is situated considerably deeper than the throat, and even within the stomach, great benefit may then be derived from a decoction of carrots in water; or 1 ounce of linseed with 1 pint of water, boiled to the consistence of a thick mucilage, and mixed with 2 oz. of honey: a table-spoonful of the latter preparation may be given occasionally.

In order to prevent this troublesome complaint, infants ought to enjoy a pure air; while the utmost attention should be bestowed on the cleanliness of both child and nurse, by daily bathing and washing with tepid water; which practices remarkably promote insensible perspiration. Farther, the mouth of infants should be frequently washed, especially after drawing the maternal milk, and during the progress of dentition: nor should their bowels be neglected; and, when obstructed, they must be attentively relieved by the use of manna, tamarinds, and other mild aperients.

THRUSH, in HORSES. See FRUSH.

THUNDER, a loud noise occasioned by the explosion of a flash of lightning, that is re-echoed from the inequalities on the surface of the earth, and frequently forms a continued rolling or rumbling sound.

Various theories have been proposed by naturalists, to account for this grand and awful phenomenon; but, like that of lightning, it is now generally understood to arise from *electricity*.

Thunder is frequently productive of beneficial effects on animal and vegetable nature; as its violent concussions contribute to disperse the noxious vapours collected in the atmosphere, during sultry

and dry summers: it may also be regarded as a prognostic of the weather. BRADLEY remarks, that frequent thunder, without lightning, is generally followed by tempestuous winds; but, in the contrary case, it predicts copious and sudden showers.

With a view to prevent fatal accidents, during violent thunder-storms, the erection of CONDUCTORS has been strongly recommended.

It has been remarked, by accurate observers, that the noise of thunder is not experienced oftener than 16 to 18 times in the year, at any fixed place. This phenomenon occurs most frequently in the months of May and July; namely, in the proportion of *three* to *one*, when compared with the months of April and September; but only in that of *two* to *one*, when contrasted with June and August. During the months of April and September, the number of thunder-storms is equal; and likewise in June and August.... They arise generally with a south-wind; less frequently with a south-west; still more rarely with east and west; and scarcely ever with north, north-west, or north-east winds. It is also remarkable, that thunder-storms are the most violent, when proceeding from regions where they seldom occur; that they happen in the afternoon, or in the evening, more usually than in the morning; and are in mountainous districts more common than in a plain country.

When swallows pursue each other in flights, with a loud noise, early in the morning, it may be considered as an almost certain indication of an approaching thunder-storm: many persons, also, feel a peculiar heaviness and langour, previously to tempestuous weather; and, though such sensations subside only when the clouds break forth in torrents of fire or rain, yet we are inclined to ascribe these symptoms to some diseased action in the animal frame, or to a preternatural susceptibility of nervous impressions. In short, if due attention were paid to the changes taking place among animals and plants, previously to the formation of thunder and lightning, we could, perhaps with the greatest precision, foretel their approach.

Lastly, to prevent unfortunate accidents during thunder-storms, we would seriously advise every person to keep at some distance from trees, and rather to expose himself to a shower. While in a room, it will be proper to avoid the fire-place, fire-irons, gilded mouldings, and all articles containing metallic ingredients....See also LIGHTNING.

THYME, or *Thymus*, L. a genus of spicy plants, comprising 17 species, of which the following are the principal, namely;

1. The *serpyllum*, COMMON, WILD, or MOTHER-OF-THYME, an indigenous perennial, growing on heaths and mountainous places, where it flowers in July and August. This plant possesses a grateful aromatic odour, and a warm, pungent taste: its dried leaves, when infused in boiling water, serve as an agreeable substitute for *tea*: the essential oil obtained from this herb is so acrid, that farriers employ it as a caustic. A little cotton wool moistened with it, and put into the hollow of an aching tooth, frequently mitigates the most excruciating pain. Bees eagerly visit the aromatic leaves of

wild thyme, which is likewise eaten by sheep and goats, but refused by hogs. There is another variety of this species, cultiva ed in gardens, and called the *Lemon-thyme*, which has broader leaves, and a more pleasant flavour.

2. The *Acinos*, Wild Basil, or Basil Thyme, grows on dry hills, in chalky and gravelly situations; flowering from June to August.... This odoriferous plant is much frequented by bees, which collect honey from its flowers.

3. The *vulgaris*, or Garden-Thyme, is originally a native of the southern parts of Europe, but is now generally cultivated in British gardens. It may be propagated either by the seed, by offsets from the roots, or by slips, planted in light, rich and well-prepared soils: its aromatic leaves are employed in broths, and for other culinary purposes. In its medicinal properties, this is one of the most powerful aromatic plants; and its essential oil is often sold in the shops, as a substitute for that of Marjoram.

Tick. See Sheep.

TIDE, denotes the rising and falling of sea-water; a phenomenon which is observable on all the shores of the ocean: it is also termed the *flux* and *re-flux*, or the alternate *ebb* and *flow*.

The water of the sea flows for about 6 hours from south to north; during which period it gradually swells, so that it enters the mouths of rivers, and counteracts the natural current from their sources. It then remains stationary for about a quarter of an hour; after which it ebbs for six hours; a similar pause of 15 minutes takes place, when it flows and ebbs alternately. Thus, the tide rises and falls once in the space of 12 hours and 48 minutes, which period constitutes a *lunar day;* as the moon passes the meridian of the earth about 48 minutes later, each succeeding day. The motion of the tides is farther influenced by the moon: hence, if that luminary be in the first and third quarters, or when it is *new* and *full*, they are high and swift, being then called *spring-tides:* on the contrary, when the moon is in the second and last quarters, they neither rise so high, nor flow with such rapidity; and are therefore termed *neap-tides*.

Various theories have been formed, to account for the phenomena of tides; the ancients attributing them to the *sun;* while some modern enquiries ascribe them to the liquefaction of the ice and snow, in the polar regions; but they are now generally understood to depend on the principle of *gravitation*.

In the 1st vol. of the *Repertory of Arts*, &c. we meet with an account of a *Tide-wheel*, that may be adapted to any kind of mill; and which was invented by Mr. Robert Leslie. As a mere description of its constituent parts would convey but an inadequate idea of its mechanism, the curious reader will resort to the work above cited; where the whole contrivance is illustrated with an engraving. We shall, therefore, only remark, that such wheel, if intended for mills, is by the inventor stated to be preferable to all others turned by the tide; for its velocity is not only greater and more uniform, but a similar quantity of water also constantly acts on the wheel, which is so constructed, as to turn the same way, both with the ebb and flow, and in a more

simple manner than any hitherto contrived. Thus, it moves *horizontally*, while the generality of tide-wheels revolve *vertically*; and the perpendicular shaft may be carried to such a height, as to admit the spur-wheel, or any other piece of mechanism, to be wholly above the surface of the water..... Lastly, it is asserted to be less expensive than other wheels of a similar construction, and may be advantageously employed for raising water; its velocity being fully sufficient, without any cog-wheels, or wallowers.

TILE, a kind of thin brick, principally employed for covering the roofs of houses; though it is sometimes used for paving cellars, kitchens, areas, &c.

Tiles are divided into various sorts, according to the purposes to which they are applied. Thus, *Plain tiles* are chiefly used for covering houses: and they ought to be $10\frac{1}{2}$ inches in length, $6\frac{1}{2}$ in breadth, and $\frac{5}{8}$ths of an inch in thickness. *Ridge-tiles* are of a semi-cylindrical form, and, by the statute, must be 13 inches in length, and also $6\frac{1}{2}$ inches in breadth: they are chiefly laid on the ridges of houses. *Corner-tiles* are first made flat, in the manner of plain tiles, excepting that they are quadrangular; the two sides forming right lines; and their ends, arches of circles: previously to burning, they are bent on a mould, like ridge-tiles; and ought to be $10\frac{1}{2}$ inches in length, and of a convenient size, being generally placed on the corners of roofs.

TILLAGE, in agriculture and gardening, denotes the different methods of moving the ground, by means of a plough, spade, or other implement, to a certain depth, so as to bring the soil to the surface, and to turn the upper part downwards; in consequence of which, the earth is less liable to be exhausted by the growth of weeds or useless plants.

The proper time for this operation, varies according to the nature of the soil: thus, in *horticulture*, hot and dry ground should be tilled, either immediately before or after rain; but, if the weather be very dry, it ought not to be stirred, unless it be speedily irrigated: in the contrary case, when the earth is strong, moist, and cold, it will be useful to employ the spade, &c. during the hottest weather.

In *agriculture*, the cold, moist, clayey, or stiff soils, generally require to be tilled *three* times, namely, in the spring, in summer, and at seed-time, for wheat; and *four* times, for barley.

The great advantages arising from tillage, consist, 1. In the pulverization of the soil, so that its nature may eventually be changed, and the toughest clay be rendered as light or friable as common earth; and, 2. In eradicating noxious weeds, by exposing their roots and stalks to the joint action of the air, moisture, and heat, by which they are converted into manure. On these principles, indeed, the new, or *horse-hoeing husbandry*, chiefly depends; and, though perhaps some agriculturists may have extolled rather too highly, the benefits derived from frequent stirring of the ground, yet it cannot be denied, that such practice greatly contributes to the improvement of the soil, especially when combined with the judicious application of manures.

Having already, at some length, described the various modes of

cultivating the soil, the reader will revert to the articles DRILLING, HARROW, HOE, PLOUGH, SPADE, &c.

[TILIA, a genus of native trees, comprehending two species. See LIME-TREE.

1. *Tilia Americana. American black Lime, or Linden-Tree*....This often becomes a tree of a large size, covered with a dark brown bark, and dividing into many branches. The leaves are large, heart-shaped, pointed, and sawed on their edges, of a deep green on their upper sides, but paler and a a little hairy underneath; and standing on long footstalks. The flowers are produced upon the small branches, and are remarkable for having an oblong *bractea* or floral leaf upon each footstalk; they are of an herbaceous colour, having narrow petals furnished with nectaries at the base. The capsules are round, a little hairy and about the size of a small pea, having each one roundish seed.

2. *Tilia Caroliniana. Carolinian oblique-leaved Lime-Tree*.....This is of a smaller growth than the former, rising commonly to the height of about forty feet, with a trunk of eighteen inches or more in diameter: covered with a lightish and somewhat furrowed bark, and sending off many branches.... The leaves are smaller and smoother than those of the other kind, somewhat heart-shaped, ending in long points, unequal at the base, or larger on one side of the midrib than the other, and slightly sawed on their edges. The bunches of flowers stand upon long slender footstalks, furnished with floral leaves. The flowers are small, and have narrow, pointed petals, furnished with nectaries or scales at the base; they diffuse a fragrant odour, and are continually haunted by bees during their continuance. An infusion of the flowers of Lime-tree has been used with success in an Epilepsy. The timber is too soft for any strong purposes, therefore, chiefly used by turners, carvers, &c. also, by architects in framing models of buildings, &c. *Marshall's Arbustrum Americanum.*]

TIMBER, a term denoting every species of wood, that is felled and seasoned, with the view of being employed in building houses, vessels, and other structures.

Of the different kinds of timber-*trees*, such as OAK, ASH, BEECH, &c. we have already treated in the progress of this work, and stated the most appropriate methods of rearing them: hence, we shall at present confine our attention to the proper times for felling, seasoning, and preserving timber.

The age at which timber-trees ought to be cut down, varies according their nature, and the purposes for which they are designed. Mr. MARSHALL observes, that poplars may stand from 30 to 50 years; ash and elm-trees, from 50 to 100 years; but oaks should on no account be *felled*, till they have attained the age of from 100 to 200 years. The durability of timber, however, depends on the soil and sub-soil, on which the trees have been produced: thus, in loose or absorbent lands, the oak and elm decay at an earlier period than those grown in cool and more retentive ground; but, in dry loams with a rocky sub-soil, the oak rapidly decays, after it has attained the age of two centuries. Farther, the CYPRESS, CEDAR, and MAHOGANY, are supposed to be in-

destructible by time, or the depredations of insects, in whatever exposure they may have been raised; and the ALDER endures the action of water, for many years longer than any other species of timber: hence it is deservedly employed for piles in constructing dams; in order to secure the banks of rivers.

The season for felling oak, or fir-timber, commences toward the end of April; though the winter is often preferred for that purpose, and likewise for cutting down ash and elm-trees; as it furnishes labour to persons who would otherwise be unemployed. All branches or limbs, that may injure the trees in their fall, ought previously to be lopped, and the trunk cut down close to the ground, unless it be grubbed or rooted up; which latter method is preferable, as well as more profitable; because timber, produced from old stocks, is of inferior value.

After the trees are felled, it will be advisable to *season* them, previously to *working* the timber: it has, therefore, been recommended to pile them, one upon another, with small blocks of wood between each, in an open but not too exposed situation; so that the sun and air may penetrate every part; the surface, or uppermost trees, being plastered with cow-dung, to prevent them from cracking. Another method is that of burying the timber in the earth; but the most effectual mode of seasoning it, by *heat*, is performed at Venice, where the trees are exposed to a strong fire, at which they are continually turned round by means of an engine, till they become *charred*, or covered with a black crust: by this expedient, the internal part of the wood is so hardened, as to resist equally the effects of earth and water, for a long series of years, without receiving any injury.

When boards or planks have been properly dried, additional care becomes necessary to preserve them against the depredations of worms, the effects of air, moisture, &c. For this purpose, Mr. EVELYN directs common sulphur to be put into a glass retort, with such a portion of aqua-fortis, as will cover it, "to the depth of three fingers:" the whole must be distilled to dryness, and rectified two or three times. The remaining sulphur is then to be exposed to the open air on a marble, or in a shallow glass-vessel, where it will liquefy into a kind of *oil*, with which the timber must be anointed: this mixture, he asserts, will not only infallibly prevent the attacks of worms, but also preserve every kind of wood from decay or putrefaction, either in air or water. Timber may also be defended from the influence of air, or moisture, by coating it two or three times with linseed oil; and some builders have advised the wood-work to be *painted*: the latter practice, however, ought to be adopted with great caution; because, though it may in some cases be proper, it should always be deferred, till the planks and similar articles have become perfectly dry.

Lastly, no *green* timber must be employed for any purpose; as it is apt to crack and splinter, when the work is completed; and will thus disfigure the most expensive buildings. Where such deformity occurs, it has been recommended to anoint the wood repeatedly with a solution of beef-suet: some carpenters, indeed, close the crevices with a composition of grease and

fine saw-dust; but the former method, in the opinion of M. Chomel, deserves the preference; as he has seen riven or split timber so perfectly closed by such expedient, that the defect was scarcely perceptible: this operation, however, ought to be performed while the wood is green. See also Board, and Dry-rot.

Timber used for buildings, especially for ships, bridges, canals, granaries, and stables, may be effectually preserved from decay, and particularly the *rot*, by repeatedly impregnating the wood with strong brine, or a solution of common salt. This simple process is attended with such decided advantage, that wood, thus prepared, will remain perfectly sound for ages. An instance of this fact lately occurred in the theatre at Copenhagen, where the lower part of the planks and joists formerly required to be replaced in a few years, till Mr. Volmeister, an architect of that city, discovered and employed the process above stated. Since that period (which includes the term exceeding 12 years) the wood, on removing one of the boards, was found in such a state of preservation, that he could not observe the least appearance of decay.

The increase of plantations, in soils properly adapted for the purpose, being an object of national importance, we have subjoined a Table; the design of which is, to shew the number of plants that may be set on an acre of land, both according to the Scotch and English admeasurement, at the distance of from 1 foot to 30 feet from each other. Thus, the scale from 1 foot to 3 feet gives the number of cabbages, which may be planted on an acre, for the feeding of cattle; while the distance from 3 to 6 feet, determines the amount of young forrest or timber-trees, that may be arranged on a similar extent of ground; the space of from 6 to 20 feet, shews those remaining after the first, second, or third cuttings; and the interval from 20 to 30 feet, points out the fruit-trees, which may be planted on one acre.

Another object, which may tend to render the following Table more interesting to the planter, is that of ascertaining the difference between the Scotch and English acres. Hence, the first numbers in the second and fifth columns represent the square feet contained in those respective measures: so that the English acre is to that computed in Scotland, as 43,560 is to 54,760 feet.

Distance.		Plants on an English Acre.		Distance.		Plants on a Scotch Acre.	
		Short 100 of 5 score.	Long 100 of 6 score.			Short 100 of 5 score.	Long 100 of 6 score.
F.	I.			F.	I.		
1		43,560	36,300	1		54,760	45,633
1	6	19,360	16,133	1	6	24,382	20,318
2		10,890	9,075	2		13,690	11,408
2	6	6,969	5,808	2	6	8,761	7,301
3		4,840	4,033	3		6,084	5,070
3	6	3,556	2,963	3	6	4,470	3,725
4		2,722	2,268	4		3,422	2,852
4	6	2,151	1,792	4	6	2,709	2,257
5		1,742	1,452	5		2,190	1,825
5	6	1,440	1,200	5	6	1,810	1,508
6		1,210	1,008	6		1,521	1,251
6	6	1,031	852	6	6	1,296	1,081
7		889	740	7		1,117	931
7	6	774	620	7	6	973	811
8		680	567	8		855	713
8	6	602	502	8	6	758	631
9		537	448	9		675	562
9	6	482	402	9	6	606	505
10		435	363	10		547	456
11		360	300	11		452	375
12		302	252	12		380	317
13		257	214	13		324	270
14		222	185	14		279	232
15		193	161	15		243	202
16		170	141	16		214	178
17		150	125	17		189	158
18		134	112	18		169	141
19		120	100	19		151	126
20		108		20		137	114
21		98		21		124	103
22		90		22		113	
23		82		23		103	
24		75		24		95	
25		69		25		87	
26		64		26		81	
27		59		27		75	
28		55		28		70	
29		51		29		65	
30		48		30		60	

[The following concise statement is taken from that very useful compilation, "*Gleanings of Husbandry*," American edition.]

"1. *State and condition of several kinds after being exposed to the weather ten years.*

a. Cedar, perfectly sound.
b. Larch, heart sound, but the sap quite decayed.
c. Spruce-fir, sound.
d. Silver-Fir, in decay.
e. Scotch-fir, much decayed.
f. Pineaster, quite rotten.
g. Chesnut, perfectly sound.
h. White Poplar, sound.
i. Beech, sound.
k. Walnut, in decay.
l. Birch, quite rotten.

2. Green fir-timber may be seasoned and rendered fit for immediate use, by soaking the planks or round trees, barked, a few days in lime water; or paying them over with lime along with water..... Limewater is made by slacking the lime in water, and the hotter it is used after the lime is slacked, the better. Mr. BORDLEY says that Dr. WHARFIELD, of Elkton, Maryland, sawed poplar logs full of sap into boards, and immediately seasoned them by fire. Some of these boards were put up in two weeks after the tree was felled; and Mr. B. admired the closeness of the joints.

3. Dry-Rot in timber may be prevented by charring the ends of the joints, and fixing them in anchorsmiths or foundery ashes laid under the flooring. Leaving one of the boards of the floor loose, and removing it at night, is said to prevent it.

The Dry-Rot is owing to a yellow fungi, and to a white mould spread by a plant, resembling a vine or sea-weed. (Calvaria *Hypoxylon.*)

4. Composition for preserving weather boarding; which is impenetrable to water, and is not injured by the action of the weather, or heat of the sun, which hardens it.

Three parts air-slacked lime, two of wood ashes, and one of fine sand, or sea-coal ashes; sift these through a fine sieve, and add as much linseed oil as will bring it to a consistence for working with a painter's brush; great care must be taken to mix it perfectly....(it is thought grinding would be an improvement).....two coats are necessary; the first rather thin, the second as thick as can conveniently be worked.

5. Painting wood before the sap is dry, hastens its decay."

The time for felling timber, is in the autumn, after having taken off the bark early in the spring; and after having suffered the new foilage to put forth and die. This fact, says Dr. DARWIN, was long since observed by S. PEPYS, in a paper published in the *Philosophical Transactions*, vol. 17. p. 455. By the pullulation of the new buds the saccharine matter in the sapwood, or alburnum is expended, and it then becomes nearly as hard and durable as the heart wood, being both less liable to decay, or to be penetrated by insects. This remark is confirmed by the experience of Mr. EDWARD DUFFIELD of Philadelphia county, as stated in vol. 2. p. 484. (with this difference, that he cut the trees in

the spring,) and by the judicious and numerous experiments of the celebrated BUFFON, an extract from whose memoir, read before the *Royal Academy of Sciences*, in 1731, may be found in a paper in the *Trans. of the Massachusetts Agricultural Society*, by B. VAUGHAN, Esq. of Hallowwell, District of Maine. After having come to the conclusion above stated, Mr. VAUGHAN continues.

"Other trials, however, were made, of which the nature and result were as follow:.....1st. A piece of wood, somewhat defective, taken from the top of a tree which had been *disbarked* and left exposed to the air after it was felled, was upon trial found to weigh more and to support more than a like piece, which was sound, and taken from the heart of one of the trees felled in its bark.....2d. The sap-wood of trees which had been disbarked while standing, was in like manner tried against sap-wood from other trees which had been cut in their bark, and was found somewhat heavier, and considerably stronger.....3d. The sap-wood of disbarked trees, if it did not equal the wood at the heart of the other trees in weight, yet exceeded it much in strength.....4th. But the outer parts of the sap-wood from disbarked trees, contrary to the general rule, (which is a circumstance highly worthy of remark,) were considerably stronger than the inner parts of the same sap-wood.

"The author explains the addition of solidity and strength in those different cases, by supposing that the growth of the trunk (in the ordinary course of nature,) arises from layers of new wood, which are applied to it externally, by means of the several juices flowing between the bark and the sap-wood. Consequently, when the bark is removed, though the trunk may live, it cannot increase in bulk; and the materials, destined for this increase, sinking into the cavities of the vessels of the sap-wood and inner-wood, harden the trunk throughout.

"An interruption then of the sap, within certain bounds, appears, according to the author, to harden the wood in proportion as it is complete; and if the author's theory above stated, be correct, it has an application here too obvious for it to be repeated.....When the bark is removed, the sap-wood in particular may be presumed to become hard, from its abounding in pores; and as the pores are largest, according to him, in the outer parts of this sap-wood, it is hence perhaps that in the outer pores the greatest change is effected.

"Under these circumstances, (says M. BUFFON) the sap-wood is no longer to be called an imperfect wood; and it thus acquires an improvement in one or two years, by being disbarked, which it would not have obtained, by the usual course of nature, in less than 12 or 15 years, (this being the time requisite for changing sap-wood into inner wood in the best soils.).....By joining then the sap-wood to the other wood, the bulk of a tree is in effect prodigiously increased, and a tree of forty years will go as far in work (according to M. BUFFON) as a tree of sixty years old in common circumstances.

"The author's general conclusion is, that, whenever the extensive operation in question in this

paper, is performed, it should be during the great flow of the sap; that is, when the vessels are most open, and the sap most in motion; and when both these circumstances are likely to remain so for some time.....By choosing this period also for the operation, he adds, that it becomes easy to perform it; for in the proper time of the sap, a man climbing upon a great tree may disbark it, from top to bottom, in less than two hours.

"All which has here been said, however, relates to oaks; for upon oaks these experiments were in general made. But the practice may be extended probably to various other species of trees: M. Buffon thinks to all.

"Before M. Buffon closed the above memoir, he received information from Mr. Hickman, a fellow of the *Royal Society* in London, stating, that the practice, which his memoir recommended, was in use in the county of Nottingham, in England. The bark (it is said) was better for tanning, and the sap-wood essentially hardened. But though the sap-wood lasted three times as long as the ordinary sap-wood, according to this account, yet its durability was not pretended to be equal to that of the wood within it.....The trees in Nottinghamshire however were represented as standing six months only, after losing their bark.

"M. Du Hamel presented a memoir on the same general subject with that of M. Buffon, in the same year, 1748; which was noticed in p. 54-58 of the *Historical Articles of the Royal Academy of Sciences* (prefixed in those days to the memoirs) for the year 1738; but the memoir itself was not then printed.

"He concludes his memoir by recommending that of M. Buffon above noticed, which according to him proves, that nearly the same results have occurred in experiments on these subjects made in the eastern and western quarters of France.

"We may take the present opportunity of suggesting the propriety of an inquiry, whether fruit-trees which have been long stripped of their bark on account of disease, acquire any additional hardness to their wood, as the result of their new bark being thin; and if so, whether the hardening of their wood was not one among the particulars necessary to render them productive; and lastly, whether such trees have grown as fast in their stems and branches, as the generality of other trees corresponding in size and situation? At the same time it may be worthy of examination, whether a ligature placed round a branch, after the manner recommended by M. Buffon, has in the end any effect upon the solidity of the wood within, at least till the growth of the branch is checked?

"The query here proposed, respecting the operation of the sun, may be extended to that of the air, the rain, the frost, and even the light.....Internal processes in the tree, such as fermentation of the sap, may also have influence on this occasion.

"If we adopt the theory of Messrs. Buffon and Du Hamel, it seems easy to conceive whence the timber of certain trees may become benefited by a removal of their branches, (while the tree is standing.) If the roots and stem continue uninjured, much superfluous sap may now remain

in motion; of which a large portion may be deposited in the pores both of the sap-wood and of the formed wood, so as to improve each of them.....Of the existence of this sap in many felled trees, in a manner capable of producing buds and shoots, without the aid either of the leaves or even of new supplies from the roots, we have evident proof from the buds and shoots and even blossoms which arise in the spring from certain stems newly cut down when without a leaf.

"How far it may be advisable to disbark and to disbranch one and the same tree, is matter for future experiment, and may lead to some decisive facts.

"It ought not, however, here to escape notice, that trees hardened by the loss of their branches, are affirmed to be freed from the attack of "worms and other accidental corruption.".....If this be true, we have a new consideration addressed to our attention, which will equally well apply to the case of disbarking timber-trees.

"If these methods have in truth the good effects thus attributed to them, they may in some degree render needless the dispute as to the season of the year proper for felling certain timber trees.....Some uncertainties, which have existed on this subject, may be seen in M. DU HAMEL's account of the contradictory practice prevailing respecting it in his time, in different countries. It may be curious to observe, that in our day, Mr. SNODGRASS, the surveyor of the shipping in the East India Company's service, (than whom no man perhaps has seen and heard more on the subject, as far as concerns England and the East Indies,) is in favour of English timber which is winter-fallen.* Indeed the question may admit of different decisions in different countries; especially as relating to trees of different species and of different ages.

"Against all these advantages, we must not admit it as any objection, that hard timber is also hard to work: for upon this principle none but soft woods ought to be employed in work: In other words, to reduce the first cost of the work, we must sacrifice all the

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* See his letter to Mr. DUNDAS, with an appendix, printed in 1797, p. 49;..... in which are many valuable facts for ship-builders. Out of 989 vessels built or repaired under his inspection in 37 years only one had foundered; while in the British navy above 60 vessels are supposed to have foundered in 9 years (from 1775 to 1784) M. DU HAMEL ridicules the idea of attending to the felling of timber in particular periods of the *moon*. (See b. 3. Ch. 5.)

[In confirmation of Mr. SNODGRASS's opinion stated above, the Editor may add, that the season in which Live Oak is cut in Georgia, influences its duration in a striking manner, as the following fact will shew. Captain FRANKFORD of Philadelphia, brought live oak from St. Simons, in 1795; and with a view to satisfy himself as to the influence of the season of cutting the wood, he procured some square pieces of a tree which had been felled in July, and also some which had been cut during the winter. Both parcels were permitted to remain in his cellar: The first mentioned decayed rapidly, and were cut up for fire-wood, in 1800; the last still retain that firmness for which live oak-wood is so remarkable. As great part of the wood for the United States frigates was cut during the warm weather, and it is known that some of them, and especially the United States, rotted in three years after she was built, it is probable the decay may be accounted for from the above circumstance.]

attention due to use and to durability.

"But it is time to make a remark applicable to the United States. It is this:

"Discussions concerning the improvement of timber are peculiarly important in a vast continent possessed of wildernesses of woods, for the timber of which more extensive markets would offer, were it in better repute for strength and durability. An increase of exportable timber would lead to an increase of freights and of seamen: At the same time that an improvement in the qualities of timber, would add to the calls for ship-building, and be highly serviceable to domestic carpentry..... These considerations will derive new weight from recollecting that the American woods contain a profusion of large trees; the chief of which are not only destitute of the solidity belonging to trees found in pastures; but, by being drawn up in consequence of having grown in company, acquire long trunks with few branches, so as to admit of being disbarked with ease up to the true height.

"To what heights in the stem, in different species of trees, and at different ages, and under different circumstances, this disbarking may be carried, is to be decided by actual trials.....It seems reasonable, however, to presume, that so much of the upper part of the tree ought to retain its bark, as shall be necessary for procuring to the part which is disbarked, its due supply of sap.

"A fact of a miscellaneous nature shall now be introduced, for it may be found to have application to the present subject.

"On the meadow-land (otherwise called interval-land) overflowed by the dam of the upper mill at Cobessee, below Hallowell, many trees have been standing for a long course of years, which though without vegetation, in consequence of the action of the water upon their roots; yet still remain erect, and (to appearance) tolerably firm. They soon ceased to live as trees, but yet long existed as timber, though exposed to all the injuries of the weather. They also seem to be more free from moss and other "accidental causes of corruption," than could from former theories, have been supposed probable; though some, which were sawed after a long period had elapsed, were found too much worm-eaten to be used as plank for shipping.

"To prevent misapprehension, however as to our general subject, in persons living in parts of the U. States, where the practice of girdling trees in the American form, is adopted, it may be proper to make the following distinction..... The object of the operations in view in this paper is, to retain a lingering life in trees for a certain period. The farmers, on the other hand, who girdle their trees, seek to procure an instant death to the leaf, and an early death to the tree; that they may immediately raise crops, and soon plough the soil without obstruction. They make a cut (or girdle as it is called) round the stem of the tree, passing through the bark into the wood itself, in order to interrupt the communications within the tree, by which the life of the tree is supported.....Objects and proceedings therefore so opposite, admit of little comparison in any point of view.

" A second reflexion shall here be introduced ; which is, that we should not suppose that the learned French Academicians from whom we have extracted the chief materials for this paper, have mistaken brittle wood for strong wood: They considered strength and toughness in all their experiments. This, however did not prevent their discovering, that the wood of the disbarked stems was hard, as well as heavy ; the strength being in proportion to the weight.....It may at the same time be allowed, because it is true, that the best timber, in process of time, when kept dry, will acquire a brittle hardness, so that even soft pine-wood shall change its qualities in this respect. But since all this timber began with being more or less tough, according to its nature, we have no unfavourable conclusions to draw from it ; particularly as worms seem to avoid this brittle wood, which is accordingly found untouched by them in various buildings in Europe erected many centuries ago.

" A third caution, also, is necessary, which has a more general application.....The experiments related in this paper have not been repeated by the compiler of it..... Yet a repetition of them is necessary ; and at the same time they ought to be extended, and the result of the whole communicated to the public. By this means we shall possess, in time, approved rules for operating upon different kinds of trees in different climates, and different situations ; and none will be better circumstanced for the purpose of benefiting by these rules, than the inhabitants of the United States, whose timber trees are so many and so various, and are spread through so many latitudes, longitudes, elevations, aspects and soils.....We add, that from the same causes, few have better opportunities than the inhabitants of the United States for making such experiments."

On raising Forest Trees from Seed.

It is with pleasure that the following communication addressed to the *Massachusetts Society for the encouragement of Agriculture*, is published. It is believed, to be the first attempt in the United States, to supply the enormous and wanton waste of our forest trees ; and the society, with great propriety, bestowed a gold medal to Col. Dodge, for his praiseworthy exertions.

" Conceiving that I was possessed of land well adapted to the growth of forest trees, I made choice of a piece of land, and pretty near the summit, from which there was a gradual descent in every direction. It had formerly been covered with a very heavy growth of white and yellow oak, and the different kinds of walnut, and hickory, growing native in this part of the country. For many years past it had been improved as a pasture, having several trees of the ancient growth scattered over, and still standing upon it..... The piece of ground on which I proposed to make the experiment contained about two acres ; and was, for the first time, ploughed up two years before ; and in each of the preceding years planted with Indian corn. The native soil is a pretty deep rich mould, inclined to moisture, and very rarely pinched with drought. Detached rocks of different sizes are scat-

tered over it. The two acres were inclosed with a good fence for the purpose of forming a forest-tree nursery. It was then ploughed once, and harrowed sufficiently to render the mould light and fine, and furrowed both ways, viz. at right angles, about four and an half feet distant. On a small part of the ground a little barn manure was put in the angles of the furrows; but on the greater part no manure of any kind was laid.

" The ground having been thus prepared, on the 10th of October, 1797, it was planted in the cross furrows, in the form of hills; a part with white and yellow oak acorns; a part with that kind of walnuts called the shag-bark; a part with chesnuts, and a part with oil-nuts, or white walnuts. Four acorns and four nuts were put in a hill through the whole nursery, and covered about three, or three and an half inches deep.

" The labour, in preparing the ground, was two and an half day's work of one man and a boy with two pair of oxen; and the man and the boy one day in planting and covering the seed.

" Desirous of varying the experiment, I had another piece of ground, containing one quarter of an acre, of a soil and situation nearly similar, prepared in the same manner. On the first day of November I sowed it, by broad cast, with the same kind of acorns and nuts, and with the seeds of white ash, and then harrowed the ground with an iron-tooth harrow.

" Just before the frost set in I examined the hills in the nursery, and found the acorns generally sprouted, and some of the sprouts more than two inches in length. The nuts appeared in the same state in which they were planted. In the spring following, I could find only four of the acorns which had sent up shoots out of the ground, and the nuts did not swell sufficiently to burst their shells. But those sowed by broad cast came up pretty well, and I had them transplanted into a part of the nursery. From these circumstances I concluded that the acorns and nuts planted in the nursery, were put into the ground too early in autumn, and were covered much too deep.

" Disappointed in the first attempt, I was still determined to make another trial on the ground inclosed for a nursery. In the latter part of October, 1798, I ploughed, harrowed and furrowed it, just as I had done the preceding autumn; and on the first day of November I planted, in the cross furrows, as before, white and yellow oak acorns, shag-bark walnuts, chesnuts and oil-nuts, and covered them, excepting four rows, much lighter than the preceding year. The acorns and nuts came up very well, excepting the four rows which were covered about three inches deep. In these rows very few appeared in the spring. By this and similar experiments made since, I have found, that both acorns and nuts vegetate best when only covered over so lightly as that no part of them can be seen above the surface. On the same day I planted a small quantity of the seeds of the elm collected at the time of the seed's falling, which came up remarkably well.

" To extend the experiment, I prepared a separate piece of ground, by ploughing and harrowing it, as I had done in the nursery.

On the 2d of November, I sowed, by broad cast,,about five hundred of the shag-bark nuts, and left them on the surface of the ground uncovered. As soon as the frost was out in the spring sufficiently to admit the plough, which was about the last of March, or the first of April, I ploughed them in very lightly. The nuts soon sprouted, and about the middle of May appeared above the surface. Most of them vegetated and came up far better than any of the other nuts or acorns.

" Care has been taken to keep all the forest trees pretty clear of weeds. The nursery has been ploughed and hoed three or four times in the course of each summer, but no hills have been raised about the trees. The labour in tending the ground has been about the same as tending so much Indian corn, and the ploughings and hoeings, about the same time in the summer.

" The growth of the shag-bark walnuts has been remarkably slow. The acorns grew considerably the two first years, and the last summer they appear to have increased somewhat in size, but most of them very little or none at all in height ; some of the largest, however, have produced luxuriant tops. The chesnuts, oil-nuts and elms, have grown well. Of all the kinds, the white-ash has much exceeded in rapidity of growth.

" In the last autumn I had growing upwards of four thousand and two hundred trees, from all the kinds of acorns, nuts and seeds which I had planted. But my nursery, which was on sloping ground, was greatly injured by an unusually heavy rain, just before the frost set in. The fall of rain was so great as to occasion several strong currents of water, which produced deep gullies through the longest direction of the ground. By this unfortunate circumstance, more than six hundred trees were torn up and destroyed.

" There are now growing (Oct. 13, 1801,) from the acorns, nuts and seed which I have planted, which are three and four years old this autumn from the time of planting, two thousand seven hundred and ninety-two white and yellow oaks....four hundred and twelve shag-bark walnuts.......forty-eight oil-nuts....one hundred and ten chesnuts....two hundred and thirty-nine elms....and forty-one white-ash.....The whole number, three thousand six hundred and forty-two.

On raising young Forest Trees from young shoots on Wood-lots.

A communication addressed to the *Massachusetts Society for promoting Agriculture*, by Moses Bullen, Esq. of Medfield....The premium of 30 dollars or silver medal, was adjudged to the author for his exertions.

" I have, for more than 20 years, turned my attention to raising forest trees, and have had the satisfaction of seeing my endeavours crowned with success. The method, by which I have succeeded, is as follows : When the wood is arrived at maturity on a piece of land, I cut it all down, not leaving a single tree ; then I pass over the land with a strong scythe, making it compleatly clean by cutting all the shrubs and bushes, which were kept under by the large trees and cattle ; and which, if suffered to remain, would ob-

struct the growth of the young shoots. After doing this, I generally have a fine thrifty parcel of young plants and sprouts, which grow rapidly. When the growth is about four or five years old, I go over it again, and cut the poorest sorts of wood, where there are enough of better; and also, once in two, three or four years, prune as many as my other avocations will allow. Many of the first trees raised were large enough for hogshead hoops, and many much too large. I have had more than 4000 poles, of the hogshead kind, cut within a few years on 10 acres of my young trees, without thinning them too much, (I am very carefull that all the best poles are not taken; which is commonly the case, where an indifferent person is suffered to go into a wood-lot for the purpose of cutting hoop-poles, to the great detriment of the owner.) The method I have taken for raising forest trees, I conceive to be the best and cheapest, that can be adopted in this part of the country. I have, by way of experiment, planted acorns, chesnuts, walnuts, and set slips of the English green willow; but have never had great success. On lands long cleared, and the growth entirely killed, I supposed ploughing and planting acorns, &c. as recommended by Dr. DEAN, to be the best. It is absolutely necessary to keep cattle and sheep away from the land where it is proposed to raise forest trees.

" When I first began to raise trees for wood, I used to leave some of the young thriftiest stands to grow scattering on the land. But a few years convinced me of my error, for the trees, so left, soon sent out their branches horizontally, preventing the growth of smaller trees, situated near them, and not growing high themselves, afforded little timber and much brush.

" I every year clear a parcel of land, where I cut my fire wood, so that I have young trees from one to twenty years growth.

" Experience has shewen me, that the sprouts of chesnut grow much more rapidly, than those of other wood, obstructing their growth. In this case, I found it advantageous to cut them down, especially such as are crooked and full of branches. Fresh sprouts will soon spring up from the root, which will commonly overtake those of the surrounding growth, making much better and straighter timber with fewer limbs.

"As wood is among the necessaries of life, wood-land is a necessary appendage to every farm. Forest-trees have the power of reproducing themselves as well as from their seeds; and, but for shamefully bad management, they would be found growing in sufficient numbers in almost every part of this country. A farmer's wood-lot should be nearly as much the object of his care as his orchard.

" In applying the axe to a wood-lot, which the owner would wish to perpetuate by a series of reproductions, the best method is to cut down every tree, as far as the axe-man goes. This will give the young and tender progeny the necessary advantages of a free circulation of the air, and of the unobstructed rays of the sun; whereas if some of the large trees be left, the shoots, which spring up from the stumps of the others, will languish beneath their shade. The part of a wood-lot, that is fel-

led by the axe, should be kept as carefully fenced as a corn-field; or otherwise the browsing of cattle, especially in the spring of the year, will poison and destroy the rising tendrils. Care should also be used to pluck off a part of the tendrils or shoots around the stumps; leaving only, by the sides of each stump, two or three of the most large and thrifty.

"By such a prudent management, a wood-lot might be rendered a perpetual fund of timber and fuel."

Dr. DARWIN observes, "If crooked young trees be repeatedly scratched internally in respect to the curvature, that they will gradually become straight, by thus encouraging the growth within the curvature, *more* than on its convex side."

The following judicious observations which shew the importance of preserving forest-trees in the U. States, are from a useful publication entitled, *The Weekly Magazine*, vol. ii. Philadelphia, 1798.

"There is, perhaps, none of the natural qualities or productions of this country, of which we may more highly boast, than our woods and forests: whether we consider them as affording the largest, strongest, or most durable timber, wood, and substances for economical purposes; their beauty in the formation of groves and avenues for our recreation and delight, or fuel which they furnish, and which is indispensable in those districts, that are destitute of, or at too great a distance from coal.

"In order to prevent further devastation, as well as to repair the injuries already committed, this very important business ought, in my opinion, to be well considered, and as soon as possible encouraged and established.

"The great importance and indispensable utility of public forests, and extensive free districts of woodland. must be so obvious, as almost to render it unnecessary to specify their advantages: however, since my fellow citizens, in general, may not have sufficiently contemplated this interesting subject in all its various views, I shall attempt to exhibit some of the most striking and interesting.

"Large districts of woodland, or native forests comprehending the various situations and qualities of soil, are the best nursery for the various tribes and families of the vegetables of the country, which by means of agriculture, pasturage, and fire, are in danger of being extirpated; and thus great injury, and perhaps, irreparable loss be rendered to the community, since some of them may possess very useful and salutary qualities, yet undiscovered.

"In order that we may avail ourselves in the most speedy and complete manner, of this very important benefit, I would propose, that every *state*, *county*, and *township* should set apart a certain extent of territory for a public and free forest, to be protected by laws enacted for that purpose; and also, that every freeholder or proprietor, be obliged by law to keep a certain number of acres of woodland, perhaps ten acres to every hundred. But freeholds or farms under fifty acres, need not be subject to this law; they may have what quantity of wood their owners may choose. Besides, every proprietor of lands lying contiguous to public roads or highways, should be obliged to plant and cultivate trees

or shrubs of a certain specified description on that part of his field, immediately adjoining the public road or highway; for which he should be allowed by law a small bounty as a compensation for his labour and expence. And the law of the state might enact certain penalties to be inflicted on persons, who should wantonly injure such trees and shrubs; because they are for shade and shelter to travellers, and a public benefit.

"The use of wood is great and indispensable for building, fencing, coopering, and other economical purposes, and especially for fuel in the northern district of the United States, particularly in regard to the poor, who even at this early day, procure it with difficulty, and at a great expence: but a township forest, or free district of woodland, to which every citizen would have equal and free recourse, under necessary and prudent regulations, would fully obviate their necessities.

"These forests should be marked out into districts, and each thinned in rotation, by taking away the full-grown, and decaying trees, and keeping up within fence or inclosure, the stumps, for the protection of the springs or sprouts. Moreover, the township would be able to sell timber and wood, which, if applied towards discharging the public expences, would be a great relief to its poor.

"The subject before us, naturally, unfolds another connected with it; I mean the propriety of re-establishing public and private forests, of the most useful and beautiful trees and shrubs, natives of this country as well as exotics, that would thrive in the climate of the United States.

"We of Philadelphia and its vicinity are well acquainted with the value and usefulness of the wood of the *White Cedar* [Cupressus thyoides]. Yet the inhabitants of West Jersey, who reap so great a profit from it, seem to manifest little concern for the protection and preservation of those valuable districts, that produce this useful wood; otherwise they would take more effectuable steps than they have hitherto done for preventing the ravages and destruction of fire; for replanting and protecting the swamps after the fire hath done its mischief, &c. Perhaps it would be a politic and prudent ordinance, to vest in the state a large district of territory, comprehending the largest proportion possible of cedar swamps, for a public forest: this would be a means of at least preventing a total destruction of this invaluable wood.

"I shall proceed now to enumerate the trees, shrubs, &c. which seem to be the most valuable and worthy of the expence and care of cultivation and protection, viz.

"Chesnut, Black and White Walnut, Plane-tree, Mulberry, Sugar-maple, Scarlet and Silver-leaved Maple, Yellow Poplar, or Tulip-tree, the varieties of Hiccory, Wild-Cherry, Locust (Robina pseudo-acacia) Honey Locust, the species and varieties of Oak, all the Pines, Red-Cedar, Bald-Cypress, Larch-tree, Hemlock-Spruce, Newfoundland-Spruce, Balm of Gilead, Linden-tree, Beech, Elm, Sassafras, Ash white and Black, Persimmon for the sake of its fruit, which is, perhaps, not inferior to

the Date, all the species of Magnolia, Rhus typhinum, with other species, Snowy Mespilus, with some other species; Haw-thorns, Myrica cerifera (Myrtle-wax tree) Æsculus pavia, varieties; Holly, Anona triloba (Papaw), with many others from the southern states, remarkable for their beauty and fragrance.

"Of exotics, Quercus ruber (English oak), Fraxinus excelsior, several species of Willow, Juglans regia (Corylus avelania), Filbert (Olea Europea), Olive, Vine Raisins and Corinths, Fig, Almond, and perhaps, upon trial and repeated experiment, many more valuable vegetables would succeed in the southern districts of the United States, i. e. from Chesapeak Bay in Virginia, to St. Mary's River in Georgia.

"The East Indies, in all parts, produce a species of tree called by the natives, and by the Europeans there, TEAK. I do not recollect the scientific name or characters; but, the timber of the TEAK-TREE surpasses all others for ship-building. I have been informed, by respectable authority, that a ship built of Teak will last twice the length of time of one constructed of the best seasoned oak: it contains an oil which prevents the iron-bolts from rusting for a great number of years, and the timber resists the worm in a surprising degree.

"I have seen two English Indiamen, built of this timber at Bombay, which, after twice the number of voyages of the English-built ships, were still in good condition. The English-built Indiamen rarely go more than four voyages; one of these Teak-built ships was on her seventh, three years ago, and is still in service.

"I remember to have seen an India galley, called the Success Galley, belonging to the Nabob of Arcot, which was built of Teak. This vessel out-sailed all SUFFREIN'S fleet at the important period when the battle of Porto Novo was fought on the coast of Coromandel. Her commander, at that time, was a relation of Mr. FENWICK, our Consul in France, and he told me that the Success Galley was, then, *seventy* years old.

"I mention these facts only to shew the advantage that would be derived from the acquisition of the TEAK. The tree abounds on the Malabar, and Coromandel coasts, on the islands of Sumatra and Java, and other islands; and seeds or plants may be obtained without the least difficulty.

"Would it not be worthy the regard of our commercial men to pay some attention to this valuable object? There can be no doubt of the tree's flourishing in our southern states. The present is the period, of all others, when such an object should excite industry and attention."

The following extract contains observations highly worthy of consideration.

"*The vast importance of American Wood and Timber, and Woodlands.*

"It is well known, that the resources of the United States in *wood* and *timber*, within a day's hauling of navigable streams are greatly reduced, and in a course of rapid consumption. Our iron-works, smith's shops, breweries,

distilleries, lime-kilns, coopers, house and ship carpenters, and joiners, cabinet-makers, wharf-builders, bridge-builders, carriage-makers, tanners, brick-makers, potters, and private families, consume yearly an immense and encreasing quantity of wood and timber in their trades and dwellings. The exports for one year, ending on the 30th September, 1800, were as follows:

19,375,625	Staves and heading,
76,027,800	Shingles,
2,121,189	Hoops and Poles,
68,825,280	Feet of Boards, Planks, &c.
164,349,894	
1195	Tons of Timber.

	Dollars.
Other wooden lumber,	73,344
Oak bark, and dye woods,	15,774
Manufactures of wood,	117,651

Besides these astonishing quantities and amounts, there were sent out of the United States the following casks made of wood, reduced to barrels:

60,000	barrels	for Pot-ash and Pearl-ash,
16,594	do.	for Apples,
2,800	do.	for Cider and Malt liquors,
75,045	do.	for Beef,
55,460	do.	for Pork,
81,199	do.	for Biscuit,
653,052	do.	for Flour,
50,388	do.	for Pickled Fish,
80,000	do.	for Flaxseed,
10,000	do.	for Indigo,
160,000	do.	for Indian and Rye meal,
14,550	do.	for Linseed oil, and other oils,
96,500	do.	for Tar, Pitch, Rosin, Turpentine, Spirits of Turpentine and Varnish,
1,400	do.	for Wax and Tallow,
1,500	do.	for Molasses,
280,000	do.	for Rice,
300,000	do.	for Tobacco,
16,000	do.	for American Spirits,
40,000	do.	for Butter, Lard, Biscuit, &c.
1,994,088	Total.	

The consumption of wood for 8000 tons of pot and pearl-ashes, and in barrels and casks for flour meal, liquors, meat, fish, oil, apples, &c. for transportation coastwise, and for home use is very great. Our public and private ships require a large quantity of wood to build and repair them. Our buildings for residence, storing goods, covering produce and cattle, mills, workshops, &c. require a prodigious mass of wooden materials. New-England, and the sandy countries, and the new settlements, build very little of brick or stone, nearly all of boards and logs. The manufactures of tar, pitch, turpentine and rosin, destroy or injure yearly a great number of trees. In addition to all these, the very great consumption and demands of Great-Britain, for timber and wooden articles and materials, and for tar, pitch and turpentine, is likely to be transferred from the Baltic countries to the United States of America, because the Baltic countries will be more and more averse to sell them. In their secret feelings, the differences are great and serious, and will probably lead to some alteration in *commerce and economy of wood*, on the part of the Northern

powers, whose stock is moreover greatly exhausted. Besides all these circumstances, it is certain that the demand for wood to rebuild, repair, and improve the West India islands, will be very great.

The high prices of coffee, sugar, rum, molasses, cotton, and other West-India productions ensure the universal cultivation of those islands, which will *at least double* the demand for American wooden materials to build, and to pack produce. It has become the interest of the people of this country, to consider its property in wood and woodlands with attention and forethought; and our merchants and government will not be unmindful of the importance of our private and public ship-building, our carrying trade, and our naval armaments, whether standing or occasional."

It may no doubt seem strange to an unthinking person, that the people of the United States should be so strongly urged to an immediate attention to forest trees. But the cause of wonder will be abated when he reflects upon the incalculable consumption of wood, and is informed, what other countries *have* done, and *are* now doing on the same subject. About four centuries since, the great scarcity of wood caused a very serious alarm in France, for the people of that country had long been in the practice now pursued in the United States, viz. to cut down the trees as wanted, without thinking how they were to be replaced, or what would supply the wants of posterity. Government therefore ordered that every man who cut down a tree should plant another, and this rule is observed even to this day. In England and Scotland, also, many thousand trees have been planting on waste plantations, every year for several years past, and there can be no doubt, but that in another century, both those countries will be well stocked with timber.

The following extract has been communicated to the public, in "*A Collection of Papers upon Naval Architecture*," now publishing in England, and deserves particular attention.

"*Means of preserving Timber in Vessels and Bridges.*

"A man who had been formerly concerned in ship-building, but for thirty years past has been a bridge-builder, had early in life observed, on examining worm-eaten ships, that the worm never eat within the seams where the caulking chisel enters, and the oil, &c. He had also observed, that the whaling vessels would be eaten to a honey comb, except a little above and below water, where the whale is brought into contact with the vessel, and is beating till it is cut up.

"A plank lying under water at a mill of his, had been obliged to be renewed annually, because eaten up by the worm within the course of the year; at length a plank was accidentally put down, which for some purpose had been thoroughly impregnated with oil; it remained seven years without being affected....hence he took the idea of impregnating the timber of his bridges thoroughly with oil, by heating the timber as deep as possible, and doing it in that state with the liver oil of the cod-fish; he had practiced this for 30

years, and there was no instance of the worm attacking his timbers, whilst those in neighbouring places were immediately destroyed .....He had used the liver oil, because very thick; experiment, he said, must shew whether other oils would do equally well. He observed that there would be no difculty in heating the planks of a ship after they were put on as well as before....but I do not recollect his mentioning ever to have tried it in the case of a ship."

Having heard that the bridges at Boston had been preserved by oiling the timbers, the Editor was induced to inquire into the fact, and he learned, "That the piles of CHARLES' river bridge, [built in 1786] were originally of oak, burnt [charred] and oiled, and are still sound. The piles of West Boston bridge [built after the former,] were *pine*, without charring or oiling, and worms soon made honey comb of them; they are all now replaced with oak oiled, and will probably continue as long as the other."]

TIME, in general, denotes either the succession of natural phenomena, occurring in the universe; or, according to Mr. LOCKE, it is a mode of duration which is marked by certain periods or measures, but principally by the motion and revolution of the sun: some philosophers, however, have lately defined time to be the duration of a thing, the existence of which is neither without beginning nor end.

Consistently with our plan, we cannot enter into any *speculative* disquisitions respecting the nature of time: we shall, therefore, only remark, that it has been divided into *astronomical* and *civil:* the former being regulated entirely by the motion of the celestial bodies; while the latter division comprehends the astronomical time adapted to the purposes of civil life; and is distinguished by years, months, days, hours, minutes, and seconds.

Few reflections are of greater importance than those on the transitory nature of time; which is perhaps the only thing in the world, that is absolutely irrecoverable: hence, we are often surprized at the conduct of those who, under the mistaken notion of *killing time*, contrive and pursue every species of dissipation, in order to suppress the occasional warning of their degraded understandings, to stifle the remaining sense of their duties, and in a manner to forget themselves as rational agents, who are appointed to fulfil certain purposes, by which they might distinguish themselves from the brute creation.... Nevertheless, a moderate participation in the amusements of the day, or the enjoyment of *select company*, is highly commendable; but, when such indulgence exceeds the limits of prudence, it not only deserves severe censure, but is ultimately attended with bitter remorse.

TIME-PIECE, a term including clocks, watches, and other contrivances, for measuring the progress, or ascertaining the duration of time.

The ancients were not acquainted with other time-pieces than the common *sun-dial*, and *water-clocks*, or vessels filled with any liquid, which was allowed to descend in drops, so that the portion thus disengaged, in an imperfect manner indicated the length of time, which

had elapsed: for these contrivances, *hour-glasses* were afterwards substituted.

The present mechanical timepieces with the pendulum, were probably invented in Italy, towards the end of the 13th, or beginning of the 14th century; but the smaller machines, called *watches*, were not known in Europe till the middle of the 17th century, when the steel spring was employed as a substitute for weights, and the spiral or regulating spring, instead of the pendulum. The merit of this invention is claimed by the city of *Nurnberg*, whence OLIVER CROMWELL was furnished with an oval watch, that is still shewn among the curiosities deposited in the British museum..... In England, these useful chronometers were first made by Dr. HOOKE; and in Holland, by HUYGENS; but the name of their original inventor is consigned to oblivion. Since that period, numerous improvements have been made by TOMPION, SULLY, LE ROI, BERTHOUD, GRAY, GRAHAM, and other artists, whose names we decline to register.

From the extensive utility of time-pieces, in measuring with exactness the periodical revolutions of planetary bodies, it was farther conjectured, that such machines might be advantageously employed for the purpose of ascertaining the longitude at sea. Various experiments have, by order of the British government, been instituted with this design; but the most correct instrument, was that constructed by the late Mr. HARRISON, and denominated a *Time-keeper;* for which the Commissioners of the Board of Longitude, in 1764, awarded him the sum of 10,000*l.* being one half of the premium which was promised by an act of parliament, passed in 1714, to the artist whose mechanical contrivance might be calculated to find the longitude at sea. Mr. HARRISON's admirable work did not vary more than 43" of time in a voyage from England to Jamaica: it was afterwards improved: and a time-piece, constructed on his principles, was sent out with Captain COOK, in 1772; which, during the space of three years, did not differ more than 14½ seconds per diem; the remaining sum of 10,000*l.* was consequently paid to the inventor. Our limits not permitting us to enter into the *rationale* of its mechanism, the reader is referred to the *Principles of Mr. HARRISON's Time-Keeper*, &c. (4to. 1767, 5*s.* Nourse), in which its construction, as well as its application, are fully stated, and illustrated with plates.

Another *time-keeper* for ascertaining the longitude, was invented, a few years since, by Mr. ARNOLD, and which during a trial of 13 months differed only 6. 69" during any two days. Its greatest variation would not have exceeded one minute of longitude, which might thus be computed with the same accuracy as the latitude can be determined. We understand, however, that this contrivance has not been introduced into the Navy.

TIMOTHY-GRASS, or *Phleum*, L. a genus of plants, comprehending eight species, four being indigenous; of which the following are the principal, namely:

1. The *nodosum*, or KNOTTY TIMOTHY-GRASS, grows chiefly on the dry, hilly, pastures in the vicinity of Bath, and flowers in the month of June....This species, in the opinion of Mr. SOLE, is well calculated for dairy pastures; as

it affords a large quantity of rich milk, and is eagerly eaten by cows. It is also relished by sheep and other cattle; though disliked by horses, where they find the meadow or fescue-grasses.

2. The *pratense*, or COMMON TIMOTHY-GRASS, thrives generally in moist pastures, and flowers in July. The culture of this grass has been strongly recommended by Mr. ROCQUE, in the 4th vol. of the *Museum Rusticum et Commerciale*. According to him, it is eaten by horses and cows, preferably to any other pasture-grass; though Dr. POULTNEY observes, that it is disliked by sheep, and is not relished by horses or cows: Mr. SOLE, and the Rev. Mr. SWAYNE, likewise remark, that the Common Timothy-grass is very coarse, of little value for cattle, and does not deserve to be cultivated in England. Notwithstanding such diversity of opinion, we appeal to the authority of LINNÆUS, who expressly states the Common Timothy-grass should be sown on lands, which have been newly drained; as it is very luxuriant, attains the height of 3 or 4 feet, and prospers in wet and marshy situations. Farther, we learn from BECHSTEIN, that its stalk grows to the height of 6 feet: that *horses*, and *swine*, are exceedingly partial to this grass; consequently, that it merits the attention of farmers who wish to improve moist meadows over-grown with moss....[See GRASS.]

TIN, or *Stannum*, one of the imperfect metals, which is obtained principally from the county of Cornwall, where it is sometimes dug up in a *native* or pure state; though more frequently mixed with a large proportion of arsenic, sulphur, and iron. The crude ore is first broken to pieces, and washed; then roasted in an intense heat, which dissipates the arsenic; and afterwards fused in a furnace, till it be reduced to a metallic state.

Tin is the lightest and most fusible of all metals: it is of a greyish-white colour; has a strong, disagreeable taste; and, when rubbed, emits a peculiar odour: it is also remarkably malleable; and, when beaten into very thin plates, or *tinfoil*, is employed in covering LOOKING-GLASSES. Farther, tin readily unites with copper, forming the compositions known under the names of BRONZE, and *Bell-metal*: by immersing thin plates of iron into melted tin, they become coated, and are then termed *Block-tin*, or *Latten*; which is manufactured into tea-canisters, and various culinary utensils.

[" a. *Native Tin*: pure native tin is so very rare, that its real existence has been doubted.

" (a) 2. *Native Oxyde*, Spathose tin ore; tin combined with oxygen and iron; is found in various modifications.

" b. *Brown Tin-stone and Spar*; consists of calx of tin, calx of iron, and acid of tungsten.

" c. *Wood-tin*, Stream Tin, or Cornish Tin Ore; found only in Cornwall, in small globular or reniform pieces, sometimes of a fibrous or radiated texture; containing tin, with oxygen and iron.

" d. *Tin Pyrites*, Sulpherised Tin, or Sulphuret of Tin; contains tin, sulphur, copper and iron, besides it's matrix; it is distinguished by it's sulphureous smell when heated."....LETTSOM's *Traveller's Companion*.

" All the acids attack reguline

tin, requiring for their saturation more of the imperfect than of the perfect oxide. The *sulphuric acid* oxidates it without dissolving it, but the *sulphureous acid* forms with it a SULPHITE, or SULPHURATED SULPHITE of TIN.

" Water is sufficient to precipitate this oxidated metal. Mr. MONNET has obtained crystals, the SULPHITE of TIN, which resemble fine needles, interlacing each other.

" In pure *nitric acid* it is directly precipitated in a white oxide. The acid must therefore be considerably diluted and no heat employed ; thus the NITRATE of TIN may be obtained.

" This nitrate burns with a white and thick flame like that of phosphorus ; and detonates when well heated in a crucible. On distillation it boils up, and fills the receiver with a white vapour, smelling like nitric acid.

" By adding a solution of gold to the solution of tin in the nitric acid, a beautiful purple precipitate falls.

" Tin is dissolved by the *muriatic acid*, cold or heated, a fetid gas being disengaged. The solution is yellowish, and the MURIATE of TIN crystalizes in needle like forms, and attracts humidity.

" The oxide in this salt is imperfect, and eagerly takes up oxygen if presented to it. This it does if brought in contact with oxy-muriatic acid in an elastic state, also in the following process.

" When amalgamated with one-fifth of mercury, and distilled with an equal quantity of the whole, of corrosive sublimate, an insipid liquor first comes over, and then white vapours, which condense into a transparent liquor, that emits a considerable quantity of vapours, by mere exposure to the air. This is the smoking liquor of Libavius ; appearing to be an OXYGENATED MURIATE of TIN.

" It is dissolved by the *oxy-muriatic acid* with vehemence, and when the acid is highly concentrated, a magma is obtained, resembling pitch, which hardens in time.

" It is dissolved in the common *aqua fortis*, prepared with salt-petre of the first boiling, for the composition for scarlet dye, from *cochinelle*. This solution often disappoints, from the variable proportions of the muriate of soda, and nitrate of pot-ash ; when it contains too little muriate, a precipitate falls ; and when the acid is in excess, it affords an obscure colour. The most accurate proportions for a good solvent of tin, are two parts of nitric, and one of muriatic acid.

" It may be combined with other metals in various proportions. The malleability of *gold* is impaired even by an exposure to its fumes. *Silver* also suffers a diminution of its malleability by being fused with it. When alloyed with *copper*, it forms BRONZE, or BELL-METAL ; with a very small proportion of *iron* it becomes harder, and more sonorous.

" Of similar mixtures the metallic *specula* for REFLECTING TELLESCOPES are cast, such as 2 parts of copper, 1 of tin, and 1-16th of arsenic.

" Three parts of *tin*, with five of *bismuth*, and two of lead, forms an alloy, which has been termed the SOFT SODDER, it liquefies in boiling water.....LICHTENBURG.

" Two parts of tin with one of bismuth afford, according to WALLERIUS, the compound called TUTENAG, an appellation which is

given in the East Indies to zinc.... GREN.

"One part of tin and one of zinc being melted together, and mixed with two of mercury, then agitated in a box rubbed with chalk, forms an AMALGAM which wonderfully augments the power of ELECTRICAL MACHINES....KIENMAYER.

"Its amalgamating with *quicksilver*, occasions its being employed in the formation of MIRRORS. 1 part of tin, 1 of lead, 1 of bismuth, and 2 of mercury, form an amalgam employed for covering CURVILINEAR GLASS MIRRORS.

"When combined with *lead* and *antimony*, it forms a mixture called PEWTER, very generally employed in fabricating vessels for various domestic purposes.

"It is also employed in the composition for printer's *types*.

"Tin is also employed in ENAMELLING. A mixture of lead and tin, 100 parts of lead to 15, 20, 30, or even 40 of tin, is to be first calcined, 100 parts of the above calx fused in a potter's furnace with 100 of sand, containing nearly a third of talc, and 25 or 30 of muriate of soda, form the composition for *earthen ware*.

"For enamelling on *metal*, the sand is previously calcined with a fourth part of muriate of soda, and even of minium. *Fluxes for the colours* are generally similar compositions, except that lead tarnishes with some colours. For delicate colours therefore similar compositions to the following may be used: Three parts of sand, one of chalk, and three of borax; or three of glass, one of borax, a fourth of nitre, and one of white oxide of antimony.

"*Painting on enamel* may be performed either on the raw or on the baked enamel. The colours are produced by the matallic oxides. The oxide of gold forms purple; iron, by peculiar management, red; lead, antimony, and silver.....yellow; copper..... green; cobalt....blue; manganese ....violet.

"From the affinity of copper with tin, it admits of being *timed*, or of having its surface covered with tin. For this purpose the copper is first scraped, or cleaned by an acid, then heated, some resinous substance being applied to prevent oxidation, and the tin is rubbed over its surface.

"If care be taken to prevent oxidation, and a proper degree of heat be employed, the tin may be made to enter into combination with *iron*, and iron may thus have its surface tinned."....PARKINSON'S *Chemical Pocket Book*.]

TINCTURE, in general, denotes a solution of the more volatile and active parts of various bodies, from the three kingdoms of Nature, by means of a proper solvent: see MENSTRUUM. This term is, however, more particularly applied to those spirituous preparations, which contain the resinous parts of vegetables, as well as their flavour and colour.

The usual solvents, employed for extracting the medicinal virtues of plants, are water, and rectified spirit of wine; the latter of which is frequently used for obtaining the active principles from resins and the essential oils, that yield them imperfectly to the former. With a view to make a tincture or *elixir*, the vegetable or other matter is usually bruised, put into a matrass, and the spirit is poured on it, to the depth of about two inches. The glass is then closed,

and placed in a sand-heat for five or six days, or till the spirit become perfectly impregnated, and acquire a deep colour. The quantity of a tincture, to be administered for one dose, varies according to its constituent parts; though it seldom exceeds a tea-spoonful, which is taken at such times as the nature of the complaint may require.

TINNING, is the process of coating copper vessels, chiefly used for culinary purposes: it is generally performed in the following manner:

If the copper be *new*, its surface is first scoured with salt and diluted sulphuric acid: next, pulverized resin is strewed over the interior part of the vessel; into which, after heating it to a considerable degree, melted tin is carefully poured, and a roll of hard-twisted flax is passed briskly over the sides and bottom, to render the coating uniform. The tinning *old* vessels, a second time, the surface is first scraped, or scoured with iron-scales, then pulverized sal-ammoniac is strewed over it, and the melted tin is rubbed on the surface with a solid piece of sal-ammoniac. The process for covering *iron* vessels with tin, corresponds with that last described; but they ought to be previously cleaned with the muriatic acid, instead of being scraped or scoured.

As many families living at a distance from towns, either have no opportunity of sending their copper utensils to be re-tinned; or carelessly overlook such necessary repair, we think it useful to observe, that the whole process may be easily performed by servants, who possess common skill and dexterity. For this purpose, the vessel ought to be previously scoured, and dried; then exposed to a moderate heat, with such a portion of pure *grain-tin* as may be sufficient to cover the inner surface: when this metal is melted, a small quantity of sal-ammoniac should be strewed over it; and immediately after, a whisk or roll of coarse and hard twisted flax most be employed, for spreading the composition uniformly over the sides and bottom of the vessel. To improve the coating, about a third part of zinc may be added to the tin; though the latter would produce the desired effect, if it could be obtained in a *pure* state.

[A new and excellent mode of tinning copper vessels is given in vol. ii. p. 208:.....it may here be well to observe, that whiting should be used to scour tinned vessels, instead of sand, which is commonly employed in the United States; and which rubs off this important coat.]

TOAD, or *Rana bufo*, L. is the most deformed and hideous of the lower animals. Its body is broad, the back is flat, and covered with a dusky skin marked with pimples; its large belly appears inflated: on account of the short legs, its motions are slow, and its retreat is filthy.

Although the external appearance of this ugly creature inspires disgust, and even horror, yet it is asserted that the eyes of toads are remarkably brilliant. Insects of all kinds, and particularly flesh-maggots, and winged ants, afford food exceedingly grateful to toads. Nevertheless, these dreaded animals possess no noxious qualities: on the contrary, it has lately been asserted, that they furnish the means of curing CANCERS, by suc-

tion. Mr. PENNANT, however, questions their efficacy, and remarks, "that they seem only to have rendered a horrible complaint more loathsome."

TOAD-FLAX. See FLAX the TOAD.

TOBACCO-PLANT, the COMMON, or *Nicotiana Tabacum*, L. is a native of America, where considerable quantities are annually raised for exporation; and also in Spain, Portugal, Turkey, and Malta.

There are eight species of this narcotic plant, but the principal varieties are known under the names of *Oronokoe*, and *Sweet-scented Tobacco:* both attain the height of from six to nine feet; being distinguished only by their deep green leaves; the former of which are longer and narrower than those of the latter. If their culture were not restricted by the legislature (half a pole of ground only being allowed for such purpose, in *physic-gardens;* but, if that space be exceeded, the cultivator is liable to a penalty of 10*l.* for every rod), they might be propagated from seed, which ought to be sown towards the middle of April, in beds of warm, rich, light soil. In the course of a month, or six weeks, they must be transplanted into similar situations, at the distance of about two feet from each other. Here they should be carefully weeded, and occasionally watered, during dry weather..... When the plants are about two feet high, they shoot forth branches; and, as these draw the nutriment from the leaves, it becomes necessary to *top*, or nip off the extremity of the stalks, in order to prevent them from attaining to a greater height; and also to remove the young sprouts, which continually shoot forth between the leaves and the stem. No farther attention will be required, till the leaves begin to ripen; a change which is known, by their becoming rough and mottled with yellow spots, and by the stalk being covered with a species of down. The tobacco plants are now cut off closely to the roots, and exposed on the dry ground to the rays of the sun, till the leaves become *wilted*, or so pliant as to bend in any direction without breaking..... They are then laid in heaps under shelter, for three or four days, in order to *sweat*, or ferment; being turned every day; next the tobacco leaves are suspended on strings, at a small distance from each other, for the space of a month; at the end of which they may be taken down, laid in heaps, and *sweated* a second time for a week, being then pressed with heavy logs of wood. The last operation is that of picking the leaves; when they are packed in hogsheads for exportation.

Uses:....Various properties have been attributed to this stupefying drug, since it was first introduced into Europe, about the middle of the 16th century. Its smoke, when properly blown against noxious insects, effectually destroys them; but the chief consumption of this plant, is in the manufactures of SNUFF and TOBACCO, or the cut leaves for SMOKING. It is likewise (though we think, without foundation), believed to prevent the return of *hunger;* and is therefore *chewed* in considerable quantities by mariners, as well as the labouring classes of people; a disgusting practice which cannot be too severely censured. For,

though in some cases, this method of using tobacco, may afford relief in the rheumatic tooth-ach, yet, as the constant mastication of it induces an uncommon discharge of saliva, its narcotic qualities operate more powerfully, and thus eventually impair the digestive organs.

As a *medicine*, the use of tobacco requires great precaution; and it should never be resorted to without professional advice: it is chiefly employed in clysters, and as an ingredient in ointments, for destroying cutaneous insects, cleansing inveterate ulcers, &c. Lastly, indeed Mr. FOWLER has successfully prescribed it, in the various forms of tincture, infusion, and pills, as a diuretic, in cases of dropsy and dysury: if one ounce of the infusion of tobacco be mixed with a pint of water-gruel, and injected as a clyster (being occasionally repeated), Dr. F. states, that it will afford great relief in obstinate constipations of the bowels.... The smoke has, for ages, been administered in the form of injection, as a sovereign remedy for the *dry-belly-ach*, prevalent in the West Indies.

Beside the varieties of this herb already described, there is another, termed ENGLISH TOBACCO, or *Nicotiana minor v. rustica*, L. it is originally a native of America; but, having been raised in some British gardens for curiosity, its leaves are frequently substituted for the genuine drug. They possess similar narcotic properties with the HEN-BANE; and may be distinguished from foreign tobacco, by the pedicles which abound on them, and also by their smallness and oval shape.

It is remarkable, that the daily smoking of tobacco, is a practice which has only within the last century become general throughout Europe, especially in Holland and Germany; where it constitutes one of the greatest luxuries with which the industrious, poor peasants, as well as the more indolent and wealthy classes, regale themselves and their friends. In Britain, however, the lower and middle ranks, only, appear to be attached to such fumigations; which, though occasionally useful in damp and mephitic situations, are *always* hurtful to persons of dry and rigid fibres, weak digestion, or delicate habits; but particularly to the young, plethoric, asthmatic, and those whose ancestors have been consumptive; or who are themselves threatened with pulmonary diseases. In proof of this assertion, we shall only remark, that a few drops of the oil distilled from the leaves of this powerful plant, taken internally, have operated as fatal poison: and, a considerable portion of such oil being disengaged within the tube of tobacco-pipes, during combustion, the noxious effects of inhaling and absorbing it by the mouth, may be easily inferred. See also SMOKING.

Lastly, the *ashes* of tobacco may be applied to many economical purposes: they not only extirpate those small and noxious vermin, *earth-slugs*, but at the same time fertilize the soil, when strewed on it early in the spring. Farther, by scattering them occasionally over the food of horses and geese, the health of these animals is said to be greatly benefited: they also afford a good tooth-powder; a strong ley; pot-ash; and an useful ingredient in the manufacture of glass. We understand that

considerable quantities of tobacco-ashes might be easily procured from the King's warehouses established for this merchandize, in London, and other sea-ports; where large parcels of *spoiled* leaves are frequently committed to the flames.

[The history of this plant, and an ample detail of the mode of its cultivation, pursued in Virginia, may be found in Col. TATHAM'S work on *Tobacco*, lately published in London.

The use of tobacco is wholly artificial, and no one who used it in any form, ever advised another to follow the example. The reader who is anxious to see its injurious effects on both body and mind, detailed in an ample manner, is referred to an excellent paper by Dr. RUSH, in his "*Essays, Literary, Moral, and Philosophical*, Philadelphia, 1798." At present, it is our business to point out the good to be derived from the use of this nauseous vegetable; and for this purpose, we shall make the following extract from an inaugural dissertation by Dr. BRAILSFORD of South-Carolina, Philadelphia, 1799.

"The medical powers of tobacco were generally known among physicians, at an early period, who ascribed many virtues to it in certain obstinate diseases. With respect to its operation as a general evacuant, I may, from my experiments, and the corroborating assertions of various authors, pronounce this medicine a valuable acquisition to the materia medica; and that its evident operation on the system, is that of a *sudorific*, an *emetic*, a *cathartic*, and a *diuretic*. Hence the propriety of its use, in a variety of diseases.

"In cases of ascites and other dropsical affections, it appears to be an invaluable remedy.

"As a diuretic, I would venture to assert, that it is excelled by few, if any of our indigenous plants..... The *digitalis purpurea*, or purple fox-glove, which grows luxuriantly in South-Carolina, has been much celebrated for its diuretic quality, by medical characters; but I have seen instances where the tobacco has eradicated several violent cases of *ascites*, where this had proved but of little effect. "Diuretics," says a much celebrated character*, "have so long been employed with benefit in the treatment of dropsies, that it becomes matter of consequence, to increase the number of the medicines of this class, and to learn how to exhibit, with more advantage, those which are already known." In how great estimation then should we hold that plant, which is evidently endowed with a power of evacuating the accumulated water by a natural discharge, for the relief of ascites and other dropsical affections, in lieu of resorting to a surgical operation, which is painful and disagreeable to the afflicted patient; that *Nicotiana* possesses that quality, no one will pretend to deny.

"Every practitioner of medicine, who has attentively perused the publication of the ingenious Dr. FOWLER, on the effects of tobacco, with respect to its diuretic quality, must candidly acknowledge its salutary effects, in cases of dropsy and dysury. The uniform result attendant on his experiments, to-

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" * See professor Barton's essay towards a *materia medica* of the United States, page 34.

gether with the many proofs of its virtues which have come under my cognizance, clearly evince the indefinite worth of this plant, and the necessity of administering it in those cases of dropsy, which seem to triumph over medicines of less efficacy, although held in the greatest repute.

"The result of this enquiry, has afforded him very favourable ideas upon the subject, and from the number of facts enumerated by him, we may infer, that tobacco, under proper regulations, may be administered internally, not only as a safe, but as an efficacious, and valuable remedy; especially, as a *powerful diuretic* in cases of dropsies and dysuries.

"To illustrate the manner of its exhibition, and also its salutary effects in many cases, I will take the liberty of inserting a few extracts from Dr. F. as related by him, and which were the results of his own observations.

"It appears from many experiments," says the doctor, "that the average dose for an adult, sufficient to produce the desired effect, will be about eighty drops of the infusion; or to speak with some latitude, from sixty drops to one hundred, and to be repeated twice a day.

"The properest times for administering the medicine, are two hours before dinner, and at bedtime; it being observed to disagree the most with the stomach, in a morning fasting. And such is the difference between morning and night, that almost every patient will require to take one fourth, and some even one third less, in the forenoon, than in the evening; in order to enable them to bear the doses, with equal convenience..... The infusion should always be administered in some vehicle; which may either be water, or any other simple drink.

"The common dose just mentioned, relates only to adults of an ordinary constitution; for it deserves particular notice, that between constitutions, which are very nervous and irritable, and those which are very robust, or torpid, or long accustomed to the use of tobacco, the doses will admit of very great, and surprising variations.

"As an illustration of this point, I shall here annex a comparative view of the doses of the infusion, administered in 94 cases of adults; taking the medium-dose of each case, and reducing the whole into four classes, according to the number of drops.

First class. Medium doses.

21 Cases (3 men, and 18 women), from 35 to 60 drops.

Second Class.

57 Cases, (29 men, and 28 women), from 60 to 100 drops.

Third Class.

13 Cases, (9 men, and 4 women), from 100 to 150.

Fourth Class.

3 Cases, (3 men), from 150 to 300 drops.

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94

Seeing the diversity of doses is so great, I would lay it down as a rule, by way of caution, to begin with 60 drops, or three fourths of the medium-dose, in a case of a delicate constitution; and to increase the number of drops, by five, eight or ten at a time, till by their obvious effects on the system, the proper dose shall be ascertained.

"But if the patient should be a male, and the constitution robust,

torpid, or accustomed to the use of tobacco, we may safely venture to begin with 80, 90 or 100 drops; and thus, with more expedition, regulate the further doses according to the effects.

" *In Nephritis*....In cases of nephritis calculosa, or gravel, the infusion of tobacco has been given with very good effect; and Dr. F. affirms, that he has seen many cases where it proved of infinite utility, and in some instances perfected radical cures. Physicians, many years back, were not ignorant of its virtues in such affections; for they have asserted that it has proved " profitable for those who are troubled with a stone in the kidney, both to ease pain and by provoking urine, to expel gravel and the stone engendered therein." *Theatrum Botanicum*, p. 711.

"*Ascarides*...A species of worms, thus termed from their incessant troublesome motion, which exites an itching. They are small and white, with sharp pointed heads, and generally exist in the rectum.

" They oftentimes occasion such uneasines in some people as to induce fainting, and frequently prove so troublesome throughout the night, as to deprive them of sleep. They are so completely enveloped in mucus, that it is with difficulty they can be eradicated, and frequently they resist the most powerful anthelmintics; but practical authors observe, " that the fumes of burning tobacco injected clysterwise into the rectum, is of singular efficacy."

" Farriers are aware of its immense virtues in such affections, for they generally pronounce it to be infallible in expelling those small worms, commonly called *bots*, which so frequently prove mortal to many horses.

"*In Asthma*....In asthmatic cases, this medicine has frequently afforded relief, by its expectorant quality. Dr. F. observes, that he has tried the infusion in many cases of asthma, where it proved expectorant, and procured relief. For agreeably to the discharge of mucus, we find the remission of coughing more or less considerable: but should an inflammatory type prevail, which generally occurs in the recent stage of this disease, its use should be protracted, until proper depletive remedies have had the effect of reducing the system to that state, which would render its exhibition the more efficacious.

" *In Odontalgia or Tooth-ach*..... In such affections, the smoking of a segar, has imparted considerable relief. A piece of lint, impregnated with the expressed juice of tobacco, has often, in some instances, acted as a charm, in mitigating the violence of the tooth-ach. The oil of tobacco, dropped on a piece of cotton, of sufficient magnitude to occupy the concavity of the affected tooth, has proved almost instantaneous in its relief. It must here be remarked that this remedy should not be adopted by persons unaccustomed to the use of tobacco, as the oil is extremely nauseous, and will oftentimes induce vomiting. In these various forms, tobacco acts by its stimulating quality, destroying the sensibility of the nerve, and thereby encountering pain. Opium oftentimes acts in like manner, but neither perfect permanent cures; for the pains frequently recur, and the only radical remedy, to which we

must ultimately resort, is the extraction of the affected tooth.

"*In Colic*....The decoction of tobacco, exhibited in the form of an injection, has afforded almost instantaneous relief, after other medicines had proved ineffectual.

"Dr. F. remarks, that by a proper administration, the violent effects of tobacco may be avoided. An ounce of the infusion he observes, will be found a medium dose, in the form of an injection, for an adult of an ordinary constitution; and the general rule by which he was guided, is as follows; supposing a common injection to have been administered without effect, I would order one of an ounce of the infusion, agreeable to the preceding observation, in half a pint of milk, or common gruel, to be immediately injected. If this procured no relief, or excited no giddiness, or nausea, continuing for the space of 30, 40, or 60 minutes; these last effects in obstinate constipations, most frequently preceding its laxative operation, then I would gradually increase the strength of the future injections, till one or other of these effects should take place.

"By this mode of proceeding, the powers of the medicine, whether successful or not, will be fully tried in the space of a few hours; a matter of serious consequence, where suspense is distressing, and delay dangerous.

"*In the Iliac passion*....“It is highly proper," says Dr. SYDENHAM, "to give a strong purging clyster, an hour or two after bleeding." Wallis's Sydenham, p. 443. In such cases, I have seen the tobacco infusion made use of with considerable advantage. The doctor himself remarks the salutary effects of tobacco in this disease. "The smoke of tobacco," he observes, "forced up through a bladder into the bowels by an inverted pipe, has been attended with very beneficial consequences."

"It is asserted in the *Encyclopædia*, that a strong decoction of tobacco thrown up the rectum, has proved of good effect in what is usually called the *stone-colic*, and also in the iliac passion.

In Hernia. (Ruptures.)....It generally occurs that costiveness is one of the most alarming symptoms attendant on this disease, for the relief of which, stimulating purgatives are generally administered; but it not unfrequently happens that they do much injury; for when they have not the desired effect, they produce a considerable nausea at the stomach, and sometimes vomiting, which promotes the pain and tension of the tumour.

"In such affections," says Mr. BELL, "I would recommend tobacco smoke thrown up in the form of injections, as preferable to every other remedy." Bell's Surgery, vol. I. p. 162.

"*In Tympanites Intestinalis*.... This is termed a flatulent dropsy, the abdomen frequently becomes considerably distended, and in such cases the chief intention is to discharge the flatulencies: various remedies have been indicated for this purpose, and there have been instances where the infusion of tobacco has proved efficacious after the failure of many of them.

"A case of two years continuance," says Dr. F. "after the trial of various remedies, has been surprisingly relieved by clysters of tobacco prepared in a very strong manner. Their operation was

moderately purgative, accompanied with nausea, vertigo, a copious perspiration, and much discharge of wind."

"*In obstinate Ulcers*...The dried leaves of tobacco, steeped in water and applied to the parts affected, have sometimes been attended with beneficial effects.

"Mr. WILLIAM BARTRAM informed me, that he knew of several long standing ulcers, after having resisted the usual remedies, that were entirely cured by the use of tobacco in the manner above specified. Dr. EARLE, of Maryland, communicated to me the case of a child, who had been for several weeks afflicted with an eruption on its head, which evaded the skill of several eminent physicians, that was ultimately cured by an old woman, who daily dressed it with an ointment of tobacco, previously washing the part with a decoction of the same.

"*In the Itch*...This fulsome disorder has frequently been cured by the application of tobacco to the affected parts. Mr. JACOBS, a gentleman from Paris, informed me, that the French physicians, make great use of the tobacco wash in obstinate cases of cutaneous eruptions. The wash is prepared in the following manner:

"To one pound of the dried tobacco leaves, add four quarts of water; let these boil slowly over a gentle fire, for the space of half an hour, then pour off the liquor, and add to it one ounce of soda or mineral alkali. The parts affected are to be well rubbed with a sufficient portion of this mixture, and to be continued from one to three weeks, according to the virulency of the case. Though it must be remarked, that in consequence of the irritability of many constitutions, great caution is requisite, with respect to its use; as it has, in some instances, occasioned vomiting, and sometimes convulsions. The same, he avers, seldom fails of curing the itch: the eruptive parts are to be washed three or four times a day, until every appearance subsides; in this way radical cures have been effected, even after the disease had resisted the most powerful medicines.

"A strong decoction of the stalks with sharp-pointed dock and alum is said to be of good service, used externally, in cuticular distempers: this is also said to be infallible in curing the mange in dogs. See the new *Encyclopædia*, by GEORGE SELBY HOWARD.

In Phtheiriasis....This is a *lousy* distemper, to which most children are generally subject, adults also at times, are afflicted with it..... Moist and warm situations promote the increase of these detestable vermin; but a cold and dry one very soon exterminate them. Four species are peculiar to the human body, viz. 1st. The *pediculi*, so called from their being more troublesome with their feet, than from their bite. They generally infest the head, particularly if sore.

"A gentleman informed me, that when young, he was neglected by his attendants, and for a time was much afflicted with the first and third species of these vermin, which occasioned obstinate eruptions, in his head, and on various parts of his body. Many medicines were tried for his relief, but without any benefit whatever..... Recourse was then had to a strong decoction of tobacco, which was applied three or four times a day,

to the parts affected, and in a fortnight or three weeks he was radically cured.

"2d. *Morpiones* or Crab-lice.... They are thus called from the analogy which they bear to a crab-fish. 3d. Body-lice. These are generated in the apparel of the filthy. 4th. A species which breed under the cuticle, and are called by some authors *cyriones*. They are of a round form, extremely minute, and are generally found in the hands and feet. By creeping under the scarfskin they induce an intolerable itching, and when the skin bursts where they lodge, clusters of them are found deposited in a small concavity.

"A good diet and attention to cleanliness contribute much to the destruction of these vermin. Mercurial ointment, and a solution of corrosive sublimate are held in the greatest estimation; but I have heard of instances, where these have failed, and an infusion of tobacco perfected a radical cure.

"A decoction of tobacco proves very destructive to flies, when sprinkled about a room.

"Dr. Shannon asserts that, there is a large fly in some parts of Africa, that produces often a dreadful disease, by depositing its ova in the mouth or nose.

"It happens frequently to negroes, and there are several examples of it among the common soldiers. While they are sleeping in the open air, the fly deposits its ova most commonly in the nose, but sometimes in the mouth. The pain, swelling, and inflammation about the face, after the maggots are formed and ready to break forth, are very great, and the poor sufferers are almost distracted..... The number of living maggots that come away, is often considerable; and they are of a large size, being nearly half an inch long. The usual remedy in such cases is, inhaling the steam of a strong decoction of tobacco through the mouth and nose, according to the seat of the disease; it procures relief: perhaps washing the mouth and syringing the nose, might be equally or more effectual.....See Shannon on medicine. p. 382.

"Tobacco as a vermifuge is deserving of being held in high repute.

"Several of the most powerful medicines, whose virtues as a vermifuge, are in the greatest estimation, appear to be but feeble in their operation, when compared with the great influence of tobacco in the expulsion of worms.

"The celebrated *Spigelia Marylandica* of Linnæus, it must be acknowledged, is very generally destructive to worms; but, agreeable to the first and seventh experiments, under the head of anthelmintics, we find that tobacco appears to be more instantaneous in its operation, though perhaps ultimately, not more effectual. Yet, from its more immediate effect on those animals, I should rather presume, that it merits the particular attention of physicians, as a valuable medicine, and that, on this consideration, it would, unquestionably be expedient to give it repeated trials in those cases, which may resist the more feeble operation of other anthelmintics.

"Dr. Shannon on medicine, p. 380, after enumerating several diseases peculiar to the Africans, observes, that the *Guinea-worm* is another evil attendant on the negroes in Africa, and is generally cured by anthelmintics.

"It may be just, therefore, to infer, that *the tobacco infusion* may be administered with very good effect.

"*As a Cathartic*....In cases of constipations of the abdominal viscera, the infusion of tobacco has sometimes been administered, and often with immediate relief by occasioning a speedy expulsion of the obstructing indurated fæces.... The smoke, says Dr. CULLEN, thrown up the rectum, will operate in like manner, and has proved beneficial, after the failure of many violent cathartics; it enters much further into the intestines than injections commonly do, and is thereby applied to a larger surface, by which means it may be rendered much more powerful than the infusion.

"A gentleman of my particular acquaintance informed me, that he was not in the habit of smoking much, but whenever he was troubled with any degree of costiveness, it was only resorting to a segar to obviate this inconvenience, which never failed of acting as a lenient purgative, and imparted immediate relief. This method he preferred to the taking of physic; as it was mild in its effects, and left his body agreeably composed.

"It is to be regretted, says Dr. FOWLER, that injections of tobacco are not in more general use; for I am thoroughly persuaded, that in cases of the colic, they would prove more successful than any other kind with which we are acquainted.

"From the many facts and observations which I have hitherto adduced, relative to the medicinal influence of tobacco, it is, doubtless, reasonable to infer, that it may prove efficacious in many diseases."

[In the *Tetanus* or lock-jaw, injections of tobacco decoction, have been used with success; they not only produce evacuations from the bowels, which are generally obstinately constipated, but tend to occasion a relaxation of the violent spasms so peculiar in this disease: on this account, they might be advantageously given in the disease produced by the bite of mad dog, to produce a suspension of the disease, and give an opportunity for the use of powerful tonic and stimulating remedies, which should be given regularly, and persisted in until a good effect be produced.]

TOES. See CHILBLAIN, and CORNS.

TOLU, or BALSAM OF TOLU, an esteemed drug which is obtained from the *Toluifera balsamum*, L. a native of South-America, whence it is imported in small gourd-shells.

This balsam is of a transparent, reddish-brown or yellow colour of a thick, tanacious consistence; and acquires such a degree of brittleness by age, that it may be easily reduced to powder. It possesses a very fragrant odour, slightly resembling that of lemons; and has a warm, sweetish taste.... The virtues of this drug correspond with those of the PERUVIAN BALSAM; but it is much milder than the latter, and therefore more frequently employed in affections of the lungs and chest, especially when combined with a decoction of white poppies, and the syrup either of marsh-mallows or pale roses.

TOM-TIT, a well-known diminutive bird, abounding in woods

and orchards, where it constructs its nest with grass, &c. in which the female deposits from three to five very small eggs.

Tom-tits have erroneously been supposed to injure the young buds and blossoms of trees, on which account, large numbers are annually caught. They are however, believed to be of great service to fruit-trees; and though a few buds or blossoms may be occasionally destroyed by them, yet such damage is amply compensated; as innumerable insects are devoured by these birds; and which, insinuating themselves into the buds, would commit irreparable injury. Hence, the increase of tom-tits ought to be encouraged; as instances have occurred, where numbers of those harmless creatures had been taken in one year, after which the blossoms of trees were, in the succeeding spring, completely destroyed.

TON, or TUN, a measure of capacity, varying in its dimensions, according to the nature of liquid or solid articles: thus, a tun of *wine* contains four hogsheads; a ton of *timber* comprises a square of 40 solid feet: and a ton of *coals* amounts to 20 cwt.

TONGUE, in the animal economy, is an organized muscle situated in the cavity of the mouth, moveable in every direction, and destined for the purposes of speech, mastication, deglutition, and suction. On the upper part, it is furnished with many small nervous warts, regulating the sense of taste: the whole is covered by the muciparous membrane lining the inside of the mouth; and which, by a duplicature at the lower part, forms the ligament called the *frenum*......If this ligament be too short (which may be ascertained by the incapacity of the infant to protrude its tongue to the gums, and between the lips; or of sucking either the breast, or a finger introduced into its mouth) an incision should be made, by a person properly qualified; and the infant, immediately after, be placed to the breast; in order to prevent its swallowing the blood. A similar operation will be requisite, as the only mean of preservation, where a fleshy tumour occurs under the tip of the tongue.

Another affection is the *Ranula*, or swelling beneath, and at the side of, the tongue; which generally arises from an obstructed salivary gland: in some instances, it contains a gritty substance, but more frequently a fetid fluid, in consequence of which, the mouth becomes inflamed. Where it proceeds from tainted milk, the nurse ought to be instantly changed, and the mouth be washed with a decoction of sage sweetened with honey; but, if the tumor be hard, it will be advisable to extirpate it by the knife: after the operation, the mouth should be frequently rinsed with milk and water.....to promote the healing of the wound gentle astringents, such as diluted tincture of bark or myrrh, will be useful, when given with due precaution.

Ulcers of the tongue are sometimes produced by the sharp edges of the teeth: in this case, the latter must be filed off, and astringent gargles frequently employed.

A more serious malady is *Glossitis*, or *Inflammation of the Tongue;* the following are its symptoms.... A partial or general tumor; the sides and lower surface are red, and uncommonly painful to the touch. Progressively, the patient's

speech, swallowing, and respiration, become affected; and, when the complaint is of a violent nature, the tongue is so tumefied that it fills up the cavity of the mouth: farther, if the inflammation should extend to the gullet, and thus impede respiration, a symptomatic sore-throat is often induced. An acute head ach, and sometimes delirium occur, which may even prove fatal. More frequently, however, it terminates either by a resolution, or by a favourable suppuration; though, in some instances, it is eventually followed by mortification, scirrhus, or cancer.

Causes......Suppressed perspiration; acrid substances taken into the mouth; or, a deposition of morbid matter from other parts, for instance, in rheumatisms, scrophula, &c.

Cure....While the patient is able to swallow, cooling aperients should be given; and, if the symptoms evince crudities in the stomach and intestines, either emetics or purgatives, according to the seat of such accumulated matter, will, in the *first* stage, prove highly efficacious. Blisters, and other vesicatories, applied to the feet and arms; or, in urgent cases, even to the neck, together with bathing the legs in tepid water, cannot fail to be useful, by diminishing the inflammation. Warm, emollient fomentations around the neck, may also be resorted to; and if the mouth be charged with phlegm or mucus, the fauces ought to be rinsed with a decoction of chamomile or elder flowers, to which a small quantity of sal-ammoniac may be added: for the same purpose, a decoction of figs in milk, will occasionally prove of service....Should venesection be indicated, it will be preferable to draw the blood by means of cupping-glasses; or, by applying leeches to the adjacent parts...-If a collection of *pus*, or an abscess be formed, the discharge must be promoted by an incision, as soon as the matter is sufficiently maturated. But, where the inflammation terminates in a SCIRRHUS, or CANCER, the reader will find the proper treatment stated under those respective heads.

Lameness of the tongue, may originate from various causes: thus, if it proceed from worms, or suppressed piles, in the former case, vermifuges, and in the latter, such remedies should be resorted to, as tend to restore that salutary evacuation, by the mildest aperients: when this affection arises from violent passions, catarrh, or is symptomatic of palsy, it will be useful to employ electricity, setons, and *blistering* cataplasms to the skin (see SINAPISM), which have frequently been attended with success.

The *palate*, or sense of *taste*, may be depraved by organic affections, or atony of the parts; by incrustations, for instance, in the thrush; in consequence of warts on the tongue, from a vitiated saliva; or the destruction of nerves proceeding to this organ; and lastly, from catarrhs, by which the head is generally affected.

If such complaint be occasioned by impurities the tongue should be frequently scraped and washed with a mixture of spring water, vinegar, and honey. A corruption of the saliva being mostly connected with other disorders, it will also be removed by the remedies employed for the cure of the latter: we shall therefore only add, that

when it arises from tainted humours (evinced by frequent, foul eructations), the repeated use of thin slices of lemons, or oranges, with a little sugar; or, rinsing the mouth with a mixture of vinegar and lime-water, will often remedy such inconvenience.

Where the sensibility of the nerves is diminished, the chewing of horse-radish, sweet flag, and similar stimulants, has frequently proved beneficial...See also DUMBNESS.

TONSILS, or vulgarly called *Almonds*, are two round glands situated collaterally at the basis of the tongue; each of them being provided with a large oval passage opening towards the fauces, whence a mucus is secreted for lubricating the mouth and gullet; such discharge being farther promoted by the action of the muscles, compressing these glands.

The principal affection incident to the tonsils, consists in an enlargement, unattended with pain, but which sometimes increases to such an alarming degree, as to threaten suffocation: in this case, relief can be obtained only by an operation. When the complaint, however, is consequent on inflammations of the adjacent parts, for instance, in the QUINSY, SCARLET-FEVER, &c. the remedies directed under those articles, may then afford relief.

TOOL, a general term denoting any small implement, which is used both for manufacturing other complex instruments or machines, and also those employed in the mechanical arts.

Tools are divided into *edged-tools*, *spring-tools*, *pointed-tools*, &c. But, consistently with the advanced state of the present work, we shall only give an account of a patent, granted in January 1795, to Mr. ARNOLD WILDE, for making plane-irons, sickles, scythes, drawing-knives, and all other kinds of edged-tools, from a preparation of cast-steel and iron, incorporated by means of fire....He directs a piece of wrought-iron to be previously heated in the fire, and hammered; after which it should be formed of the requisite size: it is then to be fixed in a mould of proper dimensions, and in such a direction that, when the cast-steel is poured into the latter, the iron may settle in the middle, or on either side..... Next, the steel must be melted in a crucible exposed to a strong fire; and, when it is nearly in a fluid state, the iron should be prepared in a *welding heat*. After clearing it from scales, or other extraneous matters, the iron is again to be fixed in the mould, and the fluid steel poured into the vacancy left for that purpose; when the whole will be united into one solid mass. .....The various tools, above-mentioned, may then be made of such compound metal in the usual manner; or by any method that should be deemed most convenient to the workman, or manufacturer.

TOOTH; and TOOTH-ACH. See TEETH.

TORMENTIL, the COMMON, or SEPT-FOIL, *Tormentilla erecta v. officinalis*, L. is an indigenous perennial, growing in moors, barren pastures, and shady places; flowering from June to September....It is eaten by cows, goats, sheep and swine; but refused by horses.

The Tormentil is propagated by planting the crowns of its bulbous roots, at the depth of one inch, and at the distance of five or six square inches...These roots are of great utility, both in domestic and in medical economy: on account

of their strong astringency, they are advantageously substituted for oak-bark in tanning, and dyeing leather of a red colour, with the addition of the water-elder berries, and alum......LEYSER observes, in his *Original Botany* (7th century of his Collection of Plants, in German), that the inspissated red juice of this root may be employed as an excellent substitute for the foreign drug, called *Dragon's blood*, in dyeing, staining, &c..... Lastly, the tormentil-root has been found remarkably efficacious in the dysentery often prevailing among cattle; and, being one of the most astringent vegetables of our climate, it may, with equal advantage, be used for similar purposes by mankind.

[Dr. WILKINSON found that Tormentil-root abounds with the tanning principle....See p. 155.]

TORTOISE, or *Testudo*, L. a genous of amphibious animals, comprehending 33 species, of which the following are the principal:

1. The *midas*. See Common TURTLE.

2. The *imbricata*, *v. caretta*, or hawk's-bill tortoise, is a native of South America; where it attains the length of three feet: its shell is divided into the upper part, which covers the back; and the lower, for the protection of the belly: it is composed of thirteen leaves, or scales that form the beautiful transparent substance, known under the name of *tortoise-shell*.

3. The *orbicularis*, or common river-turtle, inhabits the milder climates of Europe, particularly the swampy parts of Hungary and Sclavonia; its size seldom exceeding eight or nine inches in diameter. It is covered with a smooth dark shell; lives in morasses; and spends the winter under ground, in a torpid state....The flesh of this species is much esteemed on the Continent, where it is eaten by the consumptive and debilitated, on account of its restorative properties.

Turtles live on worms, insects, small fishes, and marine plants; they are reputed for their longevity, subsisting for twelve months on simple water, and evincing muscular action, after the head has been severed for a fortnight. Their progress through life is remarkably slow.

TOUCH-ME-NOT. See BALSAMINE.

TOUCH-STONE. See GOLD.

TOUCHWOOD, or SPUNK, *Boletus igniarius*, L. a species of *fungus*, or sponge, which grows on the trunks, particularly those of cherry and plum-trees; where it frequently extends to a size of from two to eight inches.

The substance of this vegetable is very hard and tough, of a tawny-brown colour, and is sometimes employed, both in England and in Germany, as a substitute for *tinder*: with this design, it is boiled in a strong ley, or urine, after which it is dried, and boiled a second time in a solution of salt-petre. It is also occasionally used as a STYPTIC; being collected in August and September; the hard external crust is separated, and the medullary part is beaten with a hammer, till it becomes soft.

TOURNIQUET, in surgery, an instrument composed of rollers, screws, straps, &c. for the purpose of compressing a limb, or other part of the body; in order to prevent too great an effusion of blood from wounds.

The tourniquet is one of the best contrivances in the art of *healing*: by compressing the blood vessels,

it may be so regulated, as completely to check the farther efflux of that vital fluid, from wounded parts; and thus frequently to save a valuable life.

Without entering into a description of the various improvements that have lately been introduced into this essential part of operative surgery, we cannot omit to recommend to our readers, who are situated at a distance from professional aid, to provide themselves with this simple and useful instrument, which may be had in the greatest perfection, of Mr. BISHOP, Philadelphia, whom we have mentioned on a similar occasion. To persons travelling, or inhabiting warm climates, a tourniquet may prove of the greatest advantage; and we conceive it to be one of the most necessary articles in a *medicine-chest*, as well as in a *case of instruments*.

Where it becomes an object of importance, to suppress the bleeding from arteries of the lower extremities, without intercepting the circulation through the whole limb, the following ingenious method of applying a tourniquet has been recommended, as perfectly safe, by a skilful young surgeon in the metropolis. After providing a hard roll of linen bandage, about 4 or 5 inches in width, and 3 in thickness, as likewise a smooth board, 9 inches in length, 3 in width, and $\frac{3}{4}$ of an inch in thickness, with the sides and ends squared at right angles; the roller is to be placed mid-way in the ham on the under sides of the knee-joint; the leg being extended in a straight line. Next, the piece of board must be laid over the roller, which is to act as a pad of compression on the *popliteal* artery that extends from the ham over the hollow of the knee; the length of the board running cross-ways, and projecting on the knee-joint on each side. Now, the girth of the tourniquet is to go round the knee above (not upon) the knee-pan, and over the projecting ends of the board. The screw should rest at the upper part of the limb and the knee-pan, having also a pad interposed between it and the skin. By this mode of compressing the popliteal artery, an important advantage is gained; because it allows the arterial circulation to proceed uninterrupted through the lateral branching vessels; the large superficial veins are not disturbed; and the limb remains in the same state as if the artery alone had been tied....In all cases of profuse hemorrhages, when there is a chance of saving the limb, such method of applying the common tourniquet, will be preferable to the usual manner, by which the circulation of the blood is entirely stopped. Farther, in gun-shot wounds, compound fractures, and secondary bleedings after amputation below the knee, the practice here suggested will generally be attended with the desired effect.

Having thus enlarged upon a subject, which materially relates to the safety of every individual, we shall only add (as supplementary to the article STYPTIC), that in accidental injuries, or wounds attended with profuse bleeding from large blood-vessels, we are not acquainted with a more simple and effectual remedy than the *Powder of Gum Arabic*. This mild application to the orifice of the vein, or artery, speedily forms an incrustation around the part affected; especially if it be immediately strewed

over the spot from which the blood issues; and if the contiguous muscles be at the same time gently compressed, till a proper bandage, roller, or tourniquet, can be procured.

TOWER-MUSTARD, the SMOOTH, or TOWER-WORT, *Turritis glabra*, L. is an indigenous plant growing in gravelly meadows, pastures, and pits, where the stalks attain the height of two feet, and the greenish-white, large flowers appear in May and June.... The taste of this vegetable resembles that of *cresses;* and, affording wholesome food for cattle, we conceive it deserves the attention of cultivators, in the northern parts of the island, which abound with dry, stony lands and pastures.... Farther, the flowers of the tower-wort supply the industrious bee with wax and honey.

TRAGACANTH, a gum obtained from the *Astragalus Tragacantha*, L. a thorny bush, growing in the Levant, in Candia, on Mounts Olympus, Ida, and Ætna.

Tragacanth is incomparably stronger than gum-arabic: one dram of the former, dissolved in a pint of water, renders it of the consistence of syrup, while an ounce of the latter is required to produce a thick mucilage: hence it is preferred to other gums in forming lozenges.

Compound powder of Tragacanth, consists of this drug, of gum-arabic, and starch, each $1\frac{1}{2}$ oz. and 3 oz. of double refined sugar; which ingredients are conjointly pulverized. .....This preparation is one of the mildest emollient remedies in hectic cases, troublesome coughs, strangury, and similar disorders, occasioned by a thin, vitiated state of the fluids; the dose being from a half to two or three drams, which may, according to circumstances, be repeated every hour, or at longer intervals.

TRAIN-OIL. See OIL.

TRANSFUSION OF BLOOD, an operation by which that fluid may be conducted from one animal body into another.

This singular and daring attempt was first undertaken by LIBAVIUS, at Halle, early in the 17th century: he recommended experiments to be made on calves, sheep, dogs, and other animals. After these had been successfully performed, a whimsical notion of prolonging human life, by the practice of transfusion, was publicly maintained, with almost general approbation by LOWER, in England; HOFFMAN, in Germany; DENIS, in France, and other bold physicians. But, when several persons unfortunately fell victims to such experiments, the flattering prospect completely vanished, till the late JOHN HUNTER resumed the subject, and treated it in a manner peculiar to his pentrating genius.

In performing the process of *transfusion*, the vein, which is usually chosen for blood-letting, was opened, and a quill, or other tube introduced in a perpendicular direction: the corresponding vein was then pierced in a healthy person, or more frequently in robust animals; and a similar tube was accommodated to the orifice in a slanting way; both tubes were then passed one into another, and thus the blood was gradually transfused; the vein being tied up, as is usual after venesection.

This operation is certainly ingenious; but, as it requires equal judgment and dexterity, we doubt whether it will ever become an

useful branch of the healing art, in the *present* state of society: nay, it appears to us, that it cannot be performed with safety, since the introduction of the late *inoculations*, excepting in very desperate cases, such as hydrophobia, or other internal poisons, in which the whole mass of the blood is in a dissolved or tainted state. Besides, this essential fluid is, in every person, of a peculiar nature adapted to his own constitution; and consequently cannot, with resonable hopes of success, be transfused into another: hence the visionary idea of renovating the animal spirits by artificial means, and of prolonging human life beyond the period appointed by Nature, must necessarily be defeated.....See also LIFE, LONGEVITY, &c.

[Sir EDMUND KING's experiments, made in the reign of CHARLES II, on transfusion, deserve to be mentioned.

The blood of a healthy spaniel was conveyed into the veins of an old mangy dog ,who was perfectly cured in less than a fortnight. The blood of a young dog was transfused into one almost blind with age, and which before could hardly move; the latter did, in two hours, leap and frisk, and yet the young dog, which received, in return, the blood of the old dog felt no sort of injury. See *Phil. Trans.* abridged, vol. iii. p. 224.]

TRANSPLANTATION, denotes the act of removing either CUTTINGS, layers, roots, or entire young plants from one soil into another.

For this purpose, Mr. FORSYTH directs the side-shoots of trees to be *cut-in*, at different lengths, from one to three feet, according to their size, in the year before they are to be transplanted; allowing them to *grow rude*, that is, without being nailed in, or cutting either the side or *fore-right* shoots, during the whole summer. In the course of the winter, the ground ought to be opened around their roots, and the strong ones *cut-in;* after which they must be covered with soil. Thus, fine young fibres will strike forth; and, in the succeeding autumn, or during the winter (the sooner the better), they may be transplanted as *standards;* care being taken to place them, like all other trees which are to be removed into different soils, in a similar aspect, or towards the same point of the compass; but, if cuttings are designed to be planted against a wall, Mr. F. advises only the roots to be divided; as by such method a considerable saving will not only result, in time and money, but the trees also will bear fruit, in the first year after their removal. He remarks, that he has often transplanted old plum-trees that had been *headed down*, and consequently made very fine roots; which he divided, and "thereby obtained four or five trees from one, cutting them so as to form them into fine heads."....See also FRUIT-TREES, ORCHARD, and PLANTING.

[TRAVELING. The many inconveniencies and the embarrassments which young travellers generally suffer from their inexperience, and want of knowledge of mankind, render the following directions of great consequence to them. They are extracted from a scarce book, by Count BERCHTOLD, entitled "An essay to direct and extend the inquiries of *Patriotic Travellers*, &c. London 1789. ....Two volumes large duodecimo.

On the most necessary qualifications for a young person intending to Travel.

" Since it is almost impossible to perform any thing well without preparation, it is indispensably necessary for a young gentleman, who is desirous to travel, either for his own improvement, the welfare of mankind in general, or for the happiness of his country in particular, to lay in a certain stock of fundamental knowledge, before he undertakes the difficult task of travelling to real advantage.

Innumerable are the objects worthy of a traveller's attention and inquiry, and some of them are of much more importance than others; in proportion to the advantages that accrue to the public from the application of the knowledge acquired of them; let me therefore advise every gentleman, who feels an irresistable and laudable inclination to collect useful information, and valuable observations, to get such insight at home into those arts and sciences, whose extent and improvement must necessarily prove beneficial to mankind in general, and to his native country in particular.

Reading and reflection will point out many objects worthy of a traveller's investigation; but experience, the first of guides, may nevertheless furnish them with that advice which perhaps will be acceptable to my readers, the hints of intelligent friends ought to supply what neither books, nor meditation can teach; therefore it should be the first principle of those whose inclination it is to travel usefully, to communicate their plan to public spirited, benevolent, and well-informed men, and to apply to them for such information on those heads, which should form the principal objects of their inquiry, and particularly respecting the welfare of mankind, and the most dangerous diseases of that political body of which they themselves are members.

Philanthrophic men will not hesitate to give a well meaning and inquisitive person all the information in their power; and though much may be learned by conversation with men of experience and understanding, yet written instructions are ever to be preferred, because a *writer* has infinitely more opportunity than a *narrator*, to reflect on the true interest of his fellow-creatures, and the memory at the same time will be much relieved.

The indispensable branches of knowledge and abilities, for travellers, are the following.

National Law.....A gentleman, desirous to discover wise laws abroad, which, if proposed to the lawgivers of his country, and introduced by him, might render his countrymen more virtuous, more industrious, richer, and happier, ought first to be well informed of the smallest defects of the National, Civil, and Criminal Legislature, and thoroughly instructed in the Municipal Laws, and Regulations of the Police.

Natural History.....The study of the general, and particular natural history of his native country, will enable him to render essential services to his fellow-creatures; but he must devote himself to those branches, which are the best calculated to promote those ends; it must also leave a very serious influence upon his mind, as he will often be excited to contemplate

and adore the stupendous power of the Divine Author of those inimitable works which he surveys.

Mineralogy, Metallurgy, and Chemistry.....The usefulness of mineralogy, metallurgy, and chemistry, is universally known, and needs no illustration; as also their general tendency to the advantage of manufactures, and consequently commerce, is readily acknowledged.

Mathematics.....The study of mathematics being very extensive, ought to be pursued with equal circumspection and industry; and those branches which are most applicable to common life, ought most principally to engage the attention.

Mathematics must also have the effect of accustoming the pupil to proceed systematically in all his undertakings, from which he will derive no inconsiderable advantage in his own private economy.

Mechanics.....The study of mechanics is of the greatest importance, and will enable him to understand with ease, the construction and application of many curious, though sometimes very complex machines, as looms, mills, and other useful contrivances, which he will have an opportunity to survey in the course of his travels, as well as to introduce in his own country.

Hydrostatics and Hydraulics..... The use of hydrostatical and hydraulical knowledge is so very extensive and advantageous, that he would be found much wanting, were he to overlook those interesting branches of practical Mathematics, without the knowledge of which, he would inspect in vain many stupendous engines, put in motion by water, which are generally productive of infinite utility in saving immense labour, and promoting with ease, many conveniencies of life to the benefit of his fellow-creatures.

Perspective.....A more than ordinary knowledge in perspective is requisite in him, who wishes to give a correct plan of machines, looms, &c. and a traveller, whose knowledge of machines enables him to form a true idea of any ingenious contrivance, will be greatly facilitated in the accurate execution of the representation of those objects which relate to the above-mentioned sciences.

Geography.....Geography is a study of so important and useful a nature, that its necessity is known to every class of men; to travellers it is the first and grand requisite, without which he is as ill provided, as he would be in attempting a journey without food or refreshment.

The use of the globes needs no recommendation to prove their matchless utility, and ought to be considered as inseparable companions to Geography.

Navigation and Ship Building.... A knowledge of nautical affairs, renders sea voyages both instructive and agreeable; for while it improves the understanding, it may at the same time prove the preservation of the life of the traveller himself, as well as those of the ship's company, from the dangers, distresses, and mishaps of the sea, by rendering a man capable of executing that which irregularity, intoxication, or other circumstances may disable those from performing, on whom the duty and obligation rests of providing for the safety both of themselves and others.

Agriculture....Agriculture being

the most useful as well as most necessary of all arts, ought to be one of the first objects to engage his serious application: an agricultural nation must of course become powerful, wealthy, and happy; and each individual ought to contribute to its advancement as much as lies in his power: this will therefore be a very great incitement to exert himself in the pursuit of rural and domestic economy.

Besides the innumerable advantages, an attentive and inteiligent observer of agricultural countries may procure to his own native soil, this study will render him still more sensible of the wants of others, and benevolent towards that most useful, and least esteemed class of men, who not only feed, but also defend their country.

The state of the labouring poor in his own country, is also such an important object of the traveller's attention and inquiry, that he ought to know it as well as he does the situation of his own family, otherwise he will not be capable of comparing it with the state of the peasantry of other countries, and consequently remain uninformed of what is necessary to be known in many respects. With a proper attention to the different methods of cultivating land in his own country, he will soon accustom himself to observe abroad, how the different soils are cultivated to the best advantage, and a little spot forced as it were to afford subsistence to a most numerous family.

Languages.....It is absolutely impossible to travel to advantage without possessing the language of the country intended to be visited for information; the Latin and French are certainly insufficient, because there are many, with whom an inquisitive traveller ought to converse, who are total strangers to both languages; and as it is to be supposed, that there are many publications in the language of the country (not to mention the written National Law, the Municipal Laws, and Regulations of the Police) which must demand his attention; it is obvious, that an assiduous study of languages is unavoidably indispensable.

It ought also to be observed, that the study of the language in the country where it is spoken, would deprive him of too great a portion of his time, which could be employed to more useful purposes.

I appeal to the experience and candor of gentlemen, who have travelled with the knowledge of of languages, who must confess, that the capability of speaking the language of the country has a powerful influence upon the minds of the natives. They commonly entertain a good idea of a foreigner, who submits to the toil of acquiring their vernacular idiom, and he meets with the same easy freedom, and is treated with the same friendly familiarity, as if he were a native.

It is also very convenient to understand, and to be understood by those who are immediately necessary to the progress of the traveller, as well as those who are the superintendants of his conduct and effects; and of the inferior class of the people, who compose the greater part of a nation, and who have no knowledge of the aforementioned languages.

The many impositions, and inconveniencies to which he is exposed, by being ignorant of the

language of the country, ought also to excite him to acquire different languages, which will not be difficult to a man of moderate patience, under the instruction of an intelligent linguist.

It will not be amiss to mention an infallible method of learning almost any language in six months, as prescribed by the famous Sir WILLIAM JONES, in his grammar of the Persian Language, who says, the scholar should translate from the language he wishes to learn, into his own, with the utmost exactness; then lay aside the original, and after a proper interval, turn the same translation back into the original, by the assistance of the grammar and the dictionary. The second translation must afterwards be compared with the original, and the faults corrected according to that model.

Arithmetic.....Is an art, which, though not in the highest esteem as a branch of polite education, has its uses, and is not much less valuable than others; a competent knowledge of figures, qualifies the the gentleman, merchant, planter, &c. to form a quick calculation in matters of comparison, produce, proportion, &c. and if the art of computing by numbers is not allowed to be ornamental, it must ever be reckoned amongst the most useful branches of general information.

Drawing.....The art of Drawing is one of the most necessary, as well as one of the politest accomplishments a traveller can possess.

The drawing of landscapes, dresses, sketching, and embellishing his own minutes, form an agreeable part of his amusements; but the scientific drawing, respecting complicate machines, engines, &c. with accuracy, in different views, is by far more useful, and accordingly has been mentioned under perspective.

A Legible and Quick Hand..... It is of the utmost importance, that a traveller be accustomed to a legible hand, the want of which will certainly expose him to many inconveniences, and finally occasion infinite delay and disappointment. Able copyists are not always to be had; and experience daily teaches us, that it is impossible to rely upon the honour of strangers, with either prudence or safety. As it is to be expected that an inquisitive traveller, will hear, see, read, and be informed of many remarkable things, none of which he would leave by choice to the chance of forgetting, a quick hand not only relieves the memory, but insures us the possession of the whole treasure, of which we could only have been able to retain perhaps a trifling part.

Voluminous papers of consequence may be occasionally lent to him, for a short time, which may not conveniently admit of being intrusted to a copyist, or any one else; and, therefore, he may not be able to reap the advantage he might wish, or his friend intended that he should.

It would also be extremely useful to be instructed in short-hand writing; and to know a secret alphabet, in order to conceal such important matters, as may be improper for the inspection of prying or designing persons.

Swimming.....Though the law of self-preservation inculcates to every one to secure himself against danger, it will not be superfluous to recommend the art of swimming to a person, who probably, in the

course of his travels, may be exposed to the danger of being drowned; besides the duty of this care of ourselves, humanity directs us to render ourselves as capable as possible to save the lives of our fellow creatures as often as an opportunity offers. What action is nobler than the preservation of a life?....There is even something divine in it!

Some people imagine erroneously, that swimming cannot be learnt by adults; yet daily experience convinces us that they are mistaken; for, provided the place of instruction does not increase the natural timidity of the pupil; if the master be expert, he will soon make a progress in this necessary art.

There are many machines constructing for buoying up the body, which might be used in the beginning, in order to accustom him to an easy position upon the water, and to inspire confidence. The most common, or best known, which occur to me at this moment, are the Cuirass of BACHSTROM, and the Scaphandre of M. L'ABBE DE LA CHAPELLE. [See p. 83 of this volume.]

Superficial Knowledge of Medicine.....Since there is no travelling without health; since innumerable are the disorders to which human nature is liable, and able physicians and surgeons not every where to be had, it is very advisable to lay in a stock of medical knowledge, sufficient to be acquainted with the chief causes of diseases, and to prepare simple remedies for those which most commonly occur.

With regard to chirurgical knowledge, it will in many instances be extremely useful to be *capable of bleeding*,* and dressing a wound, to which travellers are often exposed.

He should also know the most approved methods of recovering drowned and frozen persons, and such as have been suffocated by noxious vapours; because he will certainly find emergencies, which may call upon him for the exertions of this interesting knowledge, and enable him to preserve a life....the noblest action of which he can be capable. Travellers in hot climates are often affected by the sudden impression of the sun, called by the French *Coup de Soleil*; .....a never-failing remedy for the dangerous accidents of this kind would be of great utility.

Music.....A competent skill in this art will, on many occasions, be far more useful to a traveller than he can imagine; it will agreeably supply a want of Society, introduce him to many polite companies, and procure him valuable acquaintances. Few people dislike music, and if he should bestow his leisure hours on that innocent amusement, so as to please himself by entertaining others, his pains will be amply repaid. Music will also divert him from the gaming-table, and perhaps irregular companies, to which he will be otherwise liable.

A portable instrument, as for instance, a German flute, is preferable to larger ones.

Knowledge of Mankind.......A great many excellent works have been published on this subject in almost all the languages of Europe, by writers of experience and

* This direction is of great consequence.....*Edit.*

ability, by which I stand wholly excused from commenting further on that extensive and difficult subject, and need only add, that in order to make a rapid progress in the knowledge of Mankind, every one should inspect his own heart; before he attempts to inquire into the character of others, he should observe his own inclinations and inconsistencies, watch himself on all occasions, know his failings, analize the operations of his soul, and then proceed to observe others with the utmost attention, even in trifles. The utility of the knowledge of Mankind is obvious, it is not difficult to guide men as we please, if we are able to look into their heart and head.

Knowledge of the State of our own Country.....As certain as it is that a Physician will try in vain to cure a Patient, whose bodily constitution and disease is entirely unknown to him, so will a Patriot's inclination for finding out remedies for the diseases of the Political Body of his nation be useless, unless he knows where and how the real cause of the complaint is concealed; therefore to penetrate to the different roots of those evils which may affect his native country, and to acquire a perfect idea of the situation of his own fellow-subjects, it will be necessary to peruse attentively the hints given him by experienced and intelligent men, and to complete an economical and commercial tour through all the districts of his own country, in the company of a well-informed and inquisitive friend, avoiding all precipitation either in his inquiries, or progress of his journey.

The most common as well as the most dangerous principles of evil among nations, proceed from the oppression of the peasantry, and from an erroneous system of Agriculture; which ought to excite him to inquire as minutely as possible into the state of the labouring poor; and into the different parts of rural and domestic economy, and with the same anxiety as if sent for that purpose by Government.

It will be advisable to write down his observations upon the same plan as he proposed to himself, for his investigations in foreign countries, and by thus collecting the most extensive and useful information he can obtain respecting his own country, he will accustom himself to inquire systematically when abroad, and will be capable to compare with accuracy, the state of his own country with that of any other.

The collection of questions in the course of this work, will perhaps be of use, and facilitate his inquiries in his economical and commercial tour; which last I think needs no further observations, since I have also stated separate queries applicable to each manufacture, and sea port in general.

Previous Knowledge of the Country which the Traveller intends to visit.....Since it is confirmed by truth, that a traveller's curiosity is in proportion to his instruction, it will be necessary for him to read the best histories of the ancient and present state of the country he proposes to visit; to make extracts of them, which he might compare afterwards with his own observations; to take particular notice of the origin of the nation, its most remarkable periods, the causes of its flourishing,

languid, or declining state; of its present constitution, resources, wealth, power, &c. &c.

Under the history of the present state are comprised geographical descriptions, modern travels and journies, which will point out what hitherto remained unobserved.

It will also be requisite to procure, some time previous to his setting out, the most correct, general, and special maps of the country, to have them properly fitted up on linen, in order to render them convenient for the pocket; this map must be referred to as often as he wishes to read some account of that country.

By the frequency of inspection, the contents of the map will be deeply impressed on the mind; and by this method he will be able to select such a tour as will be probably one of the most instructive: the common road is too well known to afford any thing very new or curious, and consequently fewer discoveries are to be made upon it than upon an unbeaten one.

A traveller should also, before he sets out for any place, have an accurate description of the curiosities of the roads that leads to it, and thus himself verify what has been mentioned by others.

The more time he will bestow before hand for the acquisition of knowledge of the country he is inclined to visit. the more leisure hours he will have for occular inspection and investigation of objects worthy of his attention.

All those gentlemen who flatter themselves to have travelled usefully, will agree, that a traveller ought to know what to look for, in order to discover the object of his pursuit before he comes on the spot; otherwise it is too late; the principal work is to see how far the ideas we had formed of an object were founded on reason during anticipation.

In spite of the greatest care and attention, a great many objects will escape even a well-prepared mind; therefore people cannot familiarize themselves sufficiently at home with those objects they intend to inquire after abroad, and ought to accustom themselves to reflect often upon them before they commence their journey.

They should also have written instructions from such of their friends as have travelled, how to visit foreign countries to advantage, safely, agreeably, and cheap; compare those hints together, and follow that advice which seems the most reasonable.

It must naturally be expected, that the method of consulting the experience of intelligent persons will save the traveller much time, expence, and trouble, and greatly contribute towards his satisfaction.

The proverbial sayings of the nations, contain in a few words their manner of reasoning, and deserve to be known before he penetrates the country, that he may be previously informed of the way of thinking of the natives.

On the Objects most worthy of a Traveller's Discovery, and investigation in Foreign Countries.

The objects deserving a traveller's attention being multifarious, it will be necessary to divide them into classes according to their importance.

In the first Class belong....Such objects as affect immediately the welfare of mankind, and consequently promote the universal good, and may be investigated by every one endowed with a common share of understanding. Information, which has the public utility in view, is generally to be had without expence, and a well-directed spirit of inquiry, would prove the key to their access; therefore I am of opinion, that no traveller of any description whatever should neglect inquiring carefully into such subjects as contribute to the felicity of the human race.

The second Class contains....Objects, whereof an extensive knowledge would be capable of increasing the prosperity of a traveller's native country, and which are partly blended with the welfare of humanity at large.

The third Class comprehends..... Those aims, the objects of which invite, and have respective attraction from personal advantages and improvements, and apply to that sphere of life, in which the traveller himself is destined to act.

In the fourth Class are included... Such branches of ornamental knowledge as might be cultivated without neglecting, or slighting either one of the preceding classes, and are commonly pursued by every traveller, who wishes to convince the world of the improvement he has attained by visiting foreign countries. I shall then attempt to state the

WORTHIEST OBJECTS OF INQUIRY.

I. *Preservation of Human Life.* Since the life of man is beyond all calculable value, let me conjure every philanthropist to exert himself in collecting those regulations, charitable institutions, and studied contrivances, and every other material which can be adopted, and is calculated for preserving it.

But by taking information concerning wise laws on these heads, a traveller may be able to communicate his valuable discoveries to the lawgivers of his country, and contribute in a great degree to render his countrymen less criminal, and to save the lives of many. In what can the human mind be so happily engaged?

It will be easy to a public spirited man, who by his knowledge of mankind has acquired the art of persuading, to convince other nations of the necessity of adopting the laudable system of preventive justice.

Next to the judicious provisions I have above spoken of, there are many wise municipal laws, and orders of the police of various countries, which tend immediately to the preservation of its subjects.

Excellent regulations for preventing the plague are enjoined to the Superintendants of Lazaretto's of Leghorn, Marseilles, Malta, Ancona, &c.

New and salutary prescriptions for obviating epidemical, and endemical sicknesses, and for suppressing their progress, are to be met with chiefly in Tuscany, and in the Emperor's dominions.

Establishments for providing against scarcities of corn, and preventing the poor from perishing by Famine, are to be found in many parts of the continent, particularly in Tuscany, and Prussia.

Ordinances for preventing apparently dead bodies from being

buried alive, are wisely directed and enforced in Austria, different parts of Italy, &c.

A protecting machine for preventing the common evil of overlaying and smothering children, has been invented in Tuscany, and its use countenanced, directed and enforced by the government of Florence, and has been since adopted in Germany, Sweden, Spain, and lately in Great-Britain, where, by an accurate calculation, it has been discovered, that since the year 1686 upwards of *forty-two thousand* children have been overlaid.

Discoveries are daily made of, before unknown, causes of mortal diseases, poisonous food, such as the fish called Ciquato, at the Havannah, the plant Aethusa Cinapium. *Lin.* Cicuta Tirosa. *Lin.* &c.

Innumerable objects of this kind may be quoted, to prove how far mankind has advanced in useful discoveries, and to excite philanthropists to continue to increase them.

After the preservation of human life, nothing can offer itself as more worthy of engaging our next consideration, than

II. *The Means of providing for the most neglected Class of Inhabitants.*

The traveller's utmost care and attention is now demanded in a minute inquiry into all the charitable institutions and establishments founded for the relief of suffering humanity, as hospitals for the sick, for lying-in poor women, foundlings, and orphan-houses, mad-houses, prisons, and, in general, all such places as contain objects of our compassion.

Charitable institutions of innumerable kinds are to be found in all parts of Europe; but most generally in England, Italy, and Spain. The government of Madrid has even sent to Germany for plans of different establishments, as for instance, *La Ronda de pan y Huevos*, a society of gentlemen remarkable for the extensiveness and benevolence of their design. Next to the infirmities to which we are liable, must consider the

III. *Employment of the Poor.*

The means of employing the stout, but indolent poor, the not entirely disabled poor of both sexes, small children, poor housekeepers, and unfortunate people of the middle class of citizens, who wish to earn their bread privately in an honest manner, deserve to be considered as objects of particular notice.

So does the manner of providing for the poor, infirm, superannated, and entirely disabled; the nature and stability of the necessary funds, and the system of management of them. The manner of supplying the poor with food, agreeable to their respective ages, and at a very cheap rate, must not be forgot.

In order to have a perfect knowledge of the state of the poor, without which it is impossible to judge with any certainty of the degree of wealth and power of a nation, it will be necessary to peruse all the poor laws, to enquire how far they are enforced, and to have occular proofs, as often as circumstances will permit. After having treated of the employment of the poor, nothing can more justly demand our notice than

IV. *Improvements in Agriculture.*

It must be the greatest comfort

to a feeling mind to increase the methods of subsistence of our fellow-creatures, by an improved agriculture, by introducing useful plants, roots, grains, &c. that hitherto have not yet been cultivated in the country.

A traveller may easily procure himself that pleasure; he ought to get a list of the most celebrated husbandmen of the country, visit them, and inform himself of the most minute, as well as the most lucrative productions of rural economy; compare that account with the list of the productions of his country, of which he must carry with him a *duplicate* on his setting out from home; and if he finds any seeds, roots, or plants, unknown in his country, neither trouble nor expence must be spared to obtain a very extensive and clear description of the culture, manner of preparing, use, utility, &c. of these productions.

If he could have ocular information, it would be still better, and all he has seen or heard concerning that object, must be committed to paper on the spot, also by *duplicate;* which trifling trouble would be highly compensated, if by some accident or other one copy should be lost.

In many instances it would be advisable to make our fortunate discoveries known to our friends, who are in the agricultural line, because good things cannot be known too soon; and travellers are sometimes exposed to lose their papers and valuable informations, which are not always to be regained.

V. *Discoveries of Machines.*

Instruments and tools, calculated for lessening the fatigues of the poor husbandman, are so much more desirable, as there are many people annually enervated and lost, by violent efforts of labour; which, it is expected, will be a great excitement for the traveller's utmost exertions, to bring to light inventions of this nature.

All contrivances for clearing land from weeds, ploughing, sowing, reaping, threshing, grinding corn, draining, and flooding lands, approved methods of raising grass and vegetables, planting timber and fruit-trees, selling and transporting timber, sawing-mills of all kinds, ingenious constructions of carts, and in general, all real improvements in rural and domestic economy, deserve the greatest care and attention.

VI. *Discoveries made by, and offered to Patriotic Societies.*

Owing to the rapid progress of a general spirit of improvement in Europe, the number of patriotic, economical, and other useful societies are continually augmenting; even Spain is not backward in that respect; for towards the end of April 1788, forty-six societies of this nature existed in that country.

The greatest part of useful discoveries are certainly offered, sought for, and procured, by those kinds of societies in Europe; and humanity is undoubtedly infinitely indebted to them.

Therefore, a traveller should get a list of all the societies of this description, that are to be found in each country; and permission will easily be obtained from the respective societies, to survey the repositories of their machines; to know for what objects premiums have been given, and promised; in what they commonly consist,

&c. Perhaps it will not be difficult to get models, prints, or drawings of the machines in question, and the necessary explanations of them.

It would also be advisable to establish an intercourse by letters with the secretary, or some active member of each society, in order to be informed from time to time of any new and beneficial discoveries.

After having investigated the progress of agriculture, it will be necessary to proceed to the survey of

VII. *Manufacture and Commerce.*

There are many voluminous machines, engines, looms, and other ingenious contrivances to be found in manufactures, of which the traveller should endeavour, as much as possible, to procure models, prints, drawings, and a very circumstantial description of the construction, expence of making, and utility, as well as the use, &c. of such machines; as also a knowledge of the residence, and name of the inventor or maker, whether they are permitted to be exported or not; how long such machines may last, &c. would also be desirable.

The special subsequent queries, applicable to each manufactory, will be sufficient to explain the rest.

I will only adjoin, that a traveller, who surveys a manufactory, should also endeavour to procure a list of all the articles made there, with their respective prices.

Next to a well understood system of husbandry, commerce is the surest way of employing people in a profitable manner, and of enriching and populating a country.

Therefore a traveller, who has the welfare of his country at heart, must be very anxious to get information, how the inland branches of it are conducted, how the commercial intercourse between the country he visits, and his nation, may be increased; new branches of commerce discovered, rendered flourishing, and decayed ones revived.

Under this head is comprehended also navigation, fishery, and ship-building, each of which is capable of affording sufficient employment to the industrious class of men, and considerably increase the wealth of a nation.

A matter of no small importance is the proper regulation of

VIII. *Taxes.*

It is very desirable to know in different countries, how the poorer class of people is relieved from the burthen of partial, and unequal taxes, and which system of taxation is the most conducive to the prosperity of a nation. The objects of taxation and finance being so closely connected, that when we mention the one, it is scarcely possible to forget the other.

IX. *Finance.*

The various means employed by government, to raise great sums of money, without enervating the subject; the method of preserving the credit of the state at home, as well as abroad; and the system of well understood economy, are objects of the greatest moment to a patriotic traveller.

I shall now introduce some observations on laws and administration of justice.

X. *Laws and Aministration of Justice.*

The importance and utility of those laws intended to prevent crimes, have been already treated

of; but there are many others, both civil and criminal, worthy of being inquired into; because they contribute much towards the happiness or misery of those for whom they are made.

There are in every country, some remarkably judicious laws, though not always put in force, which deserve to be taken notice of by men inclined for information.

Italy affords an ample scope, and Tuscany more so, of legislative prudence.

Before we conclude this section, it will not be amiss to touch upon one of the first objects of the attention of the legislative power, that of

XI. *Education.*

Education has such a powerful influence upon all our actions, that it may be looked upon as the spring of the happiness or misery of man in particular, and society at large; it will invite the attention of a traveller, to inquire into the different methods of forming the bodies of children with powers of vigour, and activity, and improving their hearts and understanding.

Besides a great many useful observations that may be made, by studying national education; and to apply it to the benefit of our own native country, it will be found an easier matter to judge with some degree of certainty of the national character; because men in general adopt that character and manners, which education and habit have forcibly impressed on them.

On Information, and the Means of obtaining it.

1. Travellers ought to lay down as a rule to themselves, never to receive information upon subjects of less utility, as long as more profitable ones are challenging their attention; nevertheless it will be advisable, rather to take the trouble of inspecting ten seemingly useless objects, than to neglect examining one, that might be instructive and profitable.

2. He who looks for information, should never rely upon the reports of others, except there is a positive impossibility to do otherwise; we are often misled by our own eyes, and still oftener, if we neglect surveying things ourselves.

3. He that travels should make as many observations as he can upon every object that will present itself to him; and thus accustom himself to take notice of every thing, and nothing of consequence will escape his attention.

4. They who visit foreign countries for the sake of information, will act with prudence, to conceal the motive of their journey to such persons as may seem very anxious to know it; it will be easy to find a plausible pretext to amuse them with, without a necessity for the violation of truth; great care must be taken not to put on a mysterious air, or to incur the particular attention of inquisitive persons.

5. Before the traveller inquires into the perfect state of important objects, he should endeavour to get information respecting their beginning, their most memorable periods, and epochs, the causes of their increase or decrease, till the present moment, and to review the most authentic documents, and afterwards to form queries in such a manner, that one may lead to the other, in order to curtail the inquiry.

6. He should endeavour as much as possible to obtain a complete list of celebrated men for services rendered to the public, and know for what services the country is the most ready to be grateful.

7. Eminent booksellers will be capable of giving a traveller directions and hints concerning authors of useful literary productions, and through them he may also gain access to those sons of genius; for this reason foreigners should not neglect to visit the first booksellers' shops in every town, as soon as may be convenient. Famous authors of useless publications do not deserve the traveller's attention; time should not be trifled with, since there are plenty of more important investigations ever waiting to be made.

8. Men with the best of hearts, and improved understandings, will be the best company he can seek after; and he may be assured of being well received by them, if he discovers, that he wishes to contribute, by a collection of useful knowledge, to the welfare of humanity, and the happiness of his country; and it may be expected that they will communicate to him many observations tending to the felicity of mankind. Instructions procured by conversations with virtuous and well informed men, are very pleasing, because a man may learn with ease in a short time, what has cost them an unwearied application of many years. The maxims and remarks of such men, should be carefully treasured up, and the greatest part of a traveller's time spent in their company, as far as it can be done without inconveniencing them. A traveller who is so happy as to be admitted into an intimacy with men of merit, should endeavour at his departure from the place of their residence, to establish an epistolary intercourse and friendly connection with them, inform them of any important discoveries made in his tour, and beg them to acquaint him of any thing useful to mankind that may have been produced by them, or communicated to them by others.

9. An inquisitive traveller should also procure the address of all able artists, and a minute account of their ingenious inventions tending to promote the happiness of their fellow-creatures; it will be advisable to visit this useful class of men as soon as possible, and to communicate to them such discoveries, as have been made in the traveller's country, relative to the public good, and of which he should have a very minute description on his setting out.

This act of exchange of mutual kindness will banish reserve, and open the mind to humane sensations, and excite them to shew the traveller whatever advantage their inventions may have produced. Before the traveller leaves the place of their residence, he should establish a correspondence with these artists, in order to have an account from time to time of all new inventions and useful contrivances. A person who visits foreign countries in this manner, must without doubt collect inestimable materials for the improvement of useful arts, and advancement of really profitable science.

10. It would not be amiss to have also a list of such persons as are reputed as eccentric geniuses, and extraordinary men; an acquaintance with those kind of people, would procure the traveller all sorts of useful discoveries,which

perhaps are little esteemed in the country, because generated in the brains of a man, who is thought to be uncommon and singular.

11. It is usual, in many places, to publish all sorts of political and commercial accounts, by which a proper judgment of the country may be formed; therefore it will be necessary to apply for such information, and chiefly at the offices of those booksellers, who are the law printers of the country, and the editors of such works as concern the regulations of finance and commerce.

12. A traveller whose intention is to study the genius, manners, and customs of a nation, will find them much more original in such provinces, as are at the greatest distance from the capital. The most ancient people, and most original language of the country, are to be found among the mountaineers; the good or bad effects of the government are also more observable in distant provinces, than in those which are nearer the metropolis.

13. In order to know the character and genius of the inferior class of people, he ought to conceal his rank in his conversation with them, otherwise they will not discover themselves, or converse either free, or openly; they will endeavour to appear more than commonly civil, and the traveller will not be capable of forming a just opinion of them.

14. To ridicule the manners and customs of the foreign country the traveller is in, would argue a great imprudence and want of knowledge of mankind; he should, on the contrary, find out a reasonable excuse for the weaknesses of the nation; yet, without making himself guilty of servility, or flattery, and by conforming with circumspection to the style of the natives, he will gain the confidence of every description of its inhabitants, which will open the passage to that information which he wants.

15. His being present at civil and criminal procedures, and particularly while interesting subjects are pleading, will greatly contribute to his knowledge of the laws, and administration of justice of the country, and enable him to make important observations on the practice of its courts.

16. Travellers should avail themselves of the advantage of having a list of all the manufactures that are to be found in the country, but chiefly of those that are established in every place they pass thro', and in its neighbourhood, with as extensive a description as the instructing person can give.

17. A traveller will see a manufacture to much more advantage, and be enabled to ask more instructive questions about the business carried on in it, if he will be at the trouble, before hand, to read the whole description of its workmanship in the dictionary of arts; by these means he will be prepared for its inspection, and know chiefly what to look for, and wherein the greatest difficulty consists.

18. When travellers examine establishments of this kind, they should not neglect inquiring into the time of their institution, and the degree of increase or decrease, in order to judge of the state of industry in the country.

19. By inspecting the manufactures of a country, the inquisitive traveller should also study the taste and fancy of the natives, in order to inform his countrymen in

the manufactural line, how to supply that foreign country with such commodities, as are best adapted to its consumption and uses ; and thus keep up an extensive trade, by which its cultivators may be rendered comfortable, rich, and happy.

20. In passing through villages, he should carefully inquire how much population and consumption have increased, or decreased, during the last five, ten, or twenty years, and to what causes it is to be attributed.

21. Annals of different places contain often very useful and remarkable anecdotes ; therefore it is highly worth a traveller's attention, to peruse their index, and to extract what may be most useful in common life.

22. When a traveller inspects a library, he should not neglect asking, whether it contains manuscripts that have never yet been ushered into the world, what their titles are, and whether it is to be supposed, that they might be of any particular utility to mankind, if published.

23. When a gentleman travels in countries, which formerly have been remarkable for their splendour and riches, he ought to inform himself very accurately respecting those places where most antiquities have been dug up, of what kind they are, how they are commonly disposed of; whether ancient gold and silver coins are not bought by goldsmiths for the purpose of melting, which would be the easiest manner of procuring such coins, &c. By those kind of inquiries, many precious pieces may be rescued from the fire, and the Republic of Letters enriched by their preservation. Since Spain remains so little investigated, I hope to oblige the curious, by informing them, that in the neighbourhood of Barcelona, Tarragona, Morviedro, Valencia, Murcia, Granada, Ecija, Seville, Medina-Sidonia, Corduba, &c. many valuable antiquities of different sorts might be collected, and often bought up very cheap.

On committing Observations to Paper.

1. An inquisitive traveller should never be without paper, pen, and ink, in his pocket, because annotations made with lead pencils are easily obliterated, and thus he is often deprived of the benefit of his remarks.

2. Travellers ought to commit to paper whatever they find remarkable, hear or read, and their sensations on examining different objects; it is advisable to do it upon the spot, if the time, the place, and the circumstances will admit of it ; even such observations that promise but a remote advantage, should be written down as soon as convenient.

3. The daily remarks ought to be copied from the pocket-book into the journal before the traveller goes to rest : by using this method, nothing essential will be forgotten, and the whole remain fresh on the memory.

4. The journal ought to be written in such a manner as to admit notes to be annexed. Truth must religiously be adhered to, and elegance of expression banished from it, if it be in the least unfavourable to veracity.

5. It is very useful to keep another book besides the journal, wherein a certain number of sheets

are dedicated to each head. This book ought to contain matters of fact only, and nothing dubious should find a place in it. Travellers should generally be inclined to doubt, and never take any thing for granted, unless its truth be evident. Printed lists, accounts published by government, may notwithstanding, be false; nevertheless they deserve a place in the above mentioned book, because their authenticity seems to be confirmed by public authority. This book being an extract of the most interesting facts the journal contains, becomes the more valuable, in case the journal should be lost, because there is a dependance on the contents of it.

Since the journal may comprehend a great many interesting matters, it may not be advisable for a traveller to carry it about his person for fear of losing it, unless in the side pocket, and thus sufficiently secured against the attempts of common thieves. Travellers, who are afraid of accidents, generally keep a double journal, and preserve it in two separate places. It is also imprudent, and often very dangerous for a traveller to lend his journal; in case he has promised to a friend to communicate to him some valuable information, which he should not frequently do, it will be better to take the trouble of giving a copy of that subject, than to put the journal in another man's hand.

6. A secret, undecypherable character, already mentioned under the article, *Quick and Legible Hand*, will ever prove of infinite service.

7. A traveller's memory will be greatly relieved by putting down the queries he wishes to have answered; and the numbering of them will prevent confusion. It is necessary to be remarkably cautious with regard to these queries; they should be taken the utmost care of; for should they, by some accident, be lost, and found in some countries, where the government is conscious of its weakness, the innocent proprietor might perhaps be looked upon as a spy, and treated as such if discovered.

8. If information is given to the traveller upon any subject of consequence, it is proper to mention the name and employment of the persons who communicated it, with the place, and date, in the journal, because the veracity of the intelligence depends much on the quality of him who furnished it.

On the Means of providing for the Safety of the Traveller's Person and Property.

1. A traveller exposes himself to many inconveniencies, if he cannot depend upon the fidelity, sobriety, secrecy, intrepidity, and aversion to illicit and dangerous amusements of his servant; for this reason, his character cannot be too well known, before an agreement takes place.

A servant selected to accompany a gentleman on his travels, should be conversant with the French language; write a legible and quick hand, in order to be able to copy whatever is laid before him; know a little of surgery, and to bleed well, in case his master should meet with an accident in a spot where no chirurgical assistance is to be expected.

Gentlemen should endeavour to attach such useful servants to their persons, by showing them the

same care as a father has for his child, and promise him a settlement for life on their return.

2. Familiarity with fellow travellers beyond a certain degree, is very imprudent, and may sometimes produce dreadful consequences; never ask another man's name, the motive of his travelling, the time he intends to continue in a place; and if you observe, that people wish to know your concerns, answer them with circumspection, in such a manner, as may make them give up their curiosity without being offended.

3. The company of drinkers, players, and women, should be carefully avoided, because by associating with them, reputation, health, money, and what is still more precious, time, is lost, and melancholy experience is bought very dear.

4. There are in all countries to be found some very dissolute countrymen of every traveller, whose company is by all means to be avoided; their chief effort will be to borrow money, to live, and riot at the expence of the unexperienced; to be introduced into respectable families, to whom foreigners of prudence are recommended; and to dishonour, and possibly plunder them also. It will be advisable to inquire whether those of our countrymen, whose conduct may be suspected, frequent their ambassador's house, and how they are received there: and even if they are well received by the minister, travellers should not be too fond of their company, unless they are men of merit, and of an inquisitive turn.

5. As soon as foreigners arrive in a capital, they should wait on their ambassador, in order to claim his protection in case of an accident; and to be presented at court, and to the first nobility, if they feel a pleasure in such companies. In some places they will not be admitted into the *first companies*, unless they are known to the ambassador, which leaves an impression of respectability.

6. It would be a ridiculous vanity for a traveller to carry diamond rings, or very expensive watches, precious snuff-boxes, and valuable trinkets; they would often expose his life, and serve as a standard to inn-keepers, and others of that kind, to raise their charges by. In some countries, it is even dangerous to shew gold coins, silver spoons, and such articles; therefore too much caution cannot be used against exhibiting such dangerous property.

7. The best way of conveying papers of consequence, is to put them in a girt of buck-skin, furnished with four pockets, each one inch distant from the other; for its easier pliancy, the girt ought to be ten inches broad, and fastened under the waistcoat round the body with six small buckles, and each pocket buttoned with three very small, flat, metal buttons: it will be of great use in riding hard, and can, if properly made, contain many papers, which would easily be lost out of the pocket. To leave papers of importance behind in the trunk, is by far not so safe, because a fire may happen or the trunk may be lost by some accident.

8. Double-barrelled pocket pistols are very well calculated for the defence of the traveller, particularly those which have both barrels above, and do not require turning: it is necessary to ascer-

tain their strength before they are used; and agate stones are preferable to the common flint..... Many people prefer putting a piece of cork upon the balls, and pretend that it prevents them from moving. The best position for pistols in a coach is the horizontal one, and the little bolt which obviates their going off, is a real improvement.

9. Since it is impossible to know what goods are forbidden in different countries, information on that head should be had before foreigners enter into another territory, in order to avoid many inconveniencies, which might arise from trifles: in some countries the whole luggage is confiscated, if prohibited goods are found with them, and the owners condemned to imprisonment, or to pay a heavy fine. I instance Spain.

In case of a traveller having forbidden articles, he should dispose of them in the least profitable manner, rather than expose his honour and his purse; and in case they lay in small compass, should be discovered to the postillion, who commonly are in league with the custom-house officers, in order to divide the produce of this treacherous contract. The Italian vetturinos are famous for this insidious practice.

10. Great precaution is required in the passing of rivers, and over bridges, particularly at night.... Coachmen are liable to drink hard, and by that means frequently miss the passage, and are the cause of the destruction of the traveller, as well as of their own.

11. Travellers should not permit strangers to place themselves behind their vehicle, under any pretext whatsoever, because there are innumerable instances of coaches having been disabled from proceeding, and unsuspecting travellers robbed and killed by this scheme.

12. In suspicious places, the trunk should be placed before the coach; which place should be generally made use of as often as circumstances will admit.

13. Extensive woods should never be passed at night without the necessary precautions; and in dangerous places it is safer to walk, in order to be ready for defence, if sudden violence is offered, than to remain sitting in the coach, where little resistance can be made.

14. If foreigners are robbed at night in the streets of large towns, it will be dangerous to pursue the flying thief, because he is seldom or never alone; and the pursuer is almost sure to be wounded or killed by his lawless accomplices.

N. B. The remarks on inns contain also many important hints, relative to the safety of the traveller's person.

On the Means of preserving a Traveller's Health, particularly in hot Countries.

1. A traveller ought to be perfectly well acquainted with what agrees, or disagrees with his constitution, and observe those rules which custom has established in favour of his health, at least as far as circumstances will admit of.... He will act prudently, to pay a strict attention with regard to eating, drinking, dress, exercise, and rest; and conform to the customs, and mode of life of the most sober class of the inhabitants of the country he is in. Experience has taught people of all countries,

which manner of living is the most wholesome in the climate they inhabit.

Though the Siesta (the afternoon's sleep) agrees perfectly well with most foreigners in Spain and Italy; nevertheless it is liable to bring on apoplexies in cold climates, where meat and soporiferous malt liquors are used in great quantity. Travellers in warm countries, who may be invited to an afternoon's sleep, ought to observe, that the duration of it should be proportioned to the quick or difficult digestion of the person: one quarter of an hour, or half an hour is sufficient; people should always be awaked before the end of an hour. To sleep in an horizontal position would be prejudicial; the fittest place for that kind of rest is an arm chair, or a cannopee. The head ought to be laid high, and the body bent backwards, and a little turned towards the left side. Every thing that is likely to prevent the circulation of the blood, must be removed, otherwise violent head-aches will be felt.

3. Water is very unwholesome in some places, and ought to be considered so, if soap will not dissolve in it. If a person should happen to be very thirsty, and no other drink to be had, that water should be soaked through a piece of very fine linen, and a little vinegar, juice of lemon, or a toast put into it. It would be still better to boil it, if the circumstances will admit, and drink it when cool.... Wells that are situated in marshy grounds, or near privies, or those which are observed to have a whitish scum on the surface of the water, are generally reckoned to be unwholesome.

4. Violent exercise after dinner is prejudicial, and more so in warm countries than in cold ones; therefore people who travel on horseback, or in a vehicle, whose motion is rather violent, will act prudently, if they eat and drink sparingly..... The shaking of the carriage heats the blood, consequently strong liquors should be taken with the greatest moderation, particularly in southern climates.

5. Cleanliness requires people to bathe oftener when they are travelling, than when they are at home; yet they must be very careful never to bathe when their blood is agitated, or the stomach full, or the day is very hot. The cool morning and evening hours are the only times to take this salutiferous recreation. Even the most expert swimmer should never bathe in the sea or in a river, without taking along with him another person, who knows how to swim. He should be careful to choose a bathing place where the bottom is clear sand, and has no sea weeds upon it; for they frequently contain a species of pointed shells, which are apt to inflict dangerous wounds if trodden upon. One of the most necessary precautions in bathing, is to plunge into the water head foremost, otherwise the blood rushing into the head exposes the person to an apoplectic attack*.

6. Travellers in carriages are very liable to have their legs swelled; in order to prevent being thus incommoded, it will be advisable to wear shoes rather than boots,

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* After fatigue, the tepid bath should *never be omitted*, the middle of the day (or before dining) is the preferable time for the purpose....*Editor*.

to untie the garters, to alight now and then, and to walk as often as opportunity permits it, which will favour circulation. If the windows of the carriage are kept shut the air is soon affected, and may prove prejudicial to respiration.

7. Feather beds and counterpanes of cotton are very liable to collect noxious exhalations; for this reason those who travel, ought to make use of the hart skins, described under the remarks on inns.

8. The vapours of charcoal are also exceedingly prejudicial; people should be remarkably careful never to permit a pan of charcoal to be brought into their apartment, unless it is quite burnt to ashes; it would be dangerous to sleep with it in the bed-room; as a great many lives have been lost in that manner.

9. In marshy grounds the air is remarkably unhealthy, and there are countries, for instance, the Pontin Marshes in the Pope's dominions, where it is often attended with fatal consequences to sleep even in day time. Foreigners should inform themselves minutely concerning the salubrity or unwholesomeness of the air of those places where they sleep, and take the necessary precautions to guard against the destructive effects of the latter.

10. Sweet or boiled wines, such as are to be found in the Papal dominions on the coast of the Adriatic, delay the digestive faculty for a long time, and as they tend excessively to inflame the blood, they must be used in the most sparing manner.

11. Fresh fruit, and even the ripest grapes, relax the stomach in hot climates, and an immoderate meal on them would infallibly produce the most dangerous consequences, if bread was omitted to be eaten with them.

12. Travellers in warm climates should abstain from meat as much as possible, particularly at night, otherwise they might be exposed to putrid fevers, which are seldom easily removed.

[The personal experience of Dr. Jackson in Jamaica, and of Mr. Jackson in India, sufficiently confirms this important hint. See Jackson on Fevers, and Jackson's Tour from India to Hamburg.]

13. Sleeping with the windows open in hot climates is so unwholesome, that many have hardly time enough to repent of their imprudence. Those who travel on foot should never sleep under the shadow of a tree, or near a hemp field.

14. Thirst is more effectually quenched by eating fresh fruit, and a morsel of bread, than by drinking water: if no fruit is to be had, it is better to mix a little vinegar, or the juice of a lemon with it, than to drink it by itself.

15. After a long journey on foot, it is unwholesome to take a plentiful meal, or to sit near a great fire.

16. Such as are under the necessity of remaining in places in a marshy situation, should reside in apartments in the upper stories, and in dry houses; they ought to take proper exercise, without labour, in the sun, or in the evening damps: a just quantity of vinous liquors, and victuals of good nourishment, are necessary in such circumstances.

17. A person who is not accustomed to walk a great deal, should gradually increase the length of the station. If the wind is very

high, it is better to have it sideways, than in the face.

18. Since transpiration is easily impeded, and its effects attended with bad consequences, it is prudent for travellers on foot to wear a flannel waistcoat next the skin.

19. Fresh killed meat, greens, and fresh fish, are preferable to any other food, and simple nourishment the best.

20. Damp beds are very often found in inns little visited, and in the rooms where fire is seldom made: they ought to be carefully avoided, for they not only bring on illness, but sometimes prove the death of the person who has the misfortune to sleep in one. Those who travel should examine the beds, to see whether they are quite dry, and have the bed-clothes in their presence put before the fire. If the mattresses are suspected, it will be preferable to lie down on dry and clean straw. If a friend offers you a bed, endeavour to have it warmed, with the necessary precautions, because there are in certain houses certain beds kept only for particular visitors, and therefore they might be damp, if not used for a long while.

21. People whose clothes have been wet through, should look for very dry beds, have the sheets well aired, put on clean shirts, smoking them first with sugar, or something of that nature, and before they go to bed, rub their skins with dry flannel, which promotes perspiration. Those parts of the body that have been wet ought to be washed with luke-warm water, in which a little soap has been dissolved. Those whom circumstances may not permit to put on dry clothes, should keep their bodies in constant motion, till the clothes are become dry again upon them: this inconvenience ought to be avoided as much as possible, because it brings on rheumatic pains, agues, colics, &c. to people who are not used to it.

22. Persons who have perspired copiously from the heat of the sun, should shelter themselves as much as opportunity will permit, during the falling of the dew; if they cannot avoid it, they should by no means sit down. Continual exercise favours transpiration, and diminishes the bad consequences which the cool air exposes people to.

23. Since a body, which is void of food, is more apt to attract contagious sicknesses, a traveller should never visit an hospital in the morning before he has breakfasted; it will not be amiss to eat a bit of bread dipped in vinegar, and to wash the nostrils and mouth with camphor-vinegar, before visiting the sick. During the time he is in an hospital, he should never swallow his spittle, and rather use something to draw it up, such as spunge, and blotting-paper. It is also very wholesome to drink a glass of wine, with a little sugar and the juice of half a lemon, on these occasions.

24. Travellers should not neglect to carry with them

A bottle of vinegar, de quatre voleurs
[A vial of laudanum.
One ditto sp. sal. ammoniac.
One box of purging pills.
A lancet.]

On the Means of being supplied with Money.

1. It is very imprudent and useless for a traveller to carry a large

sum of ready money about him; he ought to be supplied with letters of credit from one town to the other.

2. Letters of credit on substantial houses, are in many respects preferable to bills of exchange; the latter may happen to be either too small or too considerable, and many times expose the traveller to a tedious law process, as well as the disagreeable necessity of delaying his journey; besides a letter of credit is generally esteemed to entitle the traveller to advice and protection from the merchant or banker.

3. It is advisable to have more than one letter of credit, in order to prevent disappointments and inconveniences, which must necessarily arise from want of money, if payment was to be refused.

4. If a traveller takes a letter of credit from a banker, who requires immediate security for the credit which he gives, it will be more advantageous to deposit such notes as bear interest, than to deliver him ready money, for which the banker will perhaps not allow any interest; or at least not so much as may be expected: but the guarrantee of a friend known to, and accepted of, by the banker is most convenient, and in general use.

5. In all the countries of Europe counterfeited bank-notes and bills of this kind are to be found; therefore travellers cannot be too careful in this respect, and ought never to receive paper money, unless from people of well known credit, particularly in the Pope's dominions.

6. In many parts of Europe, gold has sometimes an extra value, which travellers are obliged to allow to the bankers, and which other persons will not agree to in payments; therefore it is necessary to be well informed in that respect, in order to avoid losses.

On Letters of Recommendation.

1. A traveller, who wishes to have the benefit of his ambassador's protection, should either be known to him before, or be introduced by letter, or be presented to him by a respectable person.

2. Besides the Letters of Recommendation to the ambassador, travellers should be furnished with letters for bankers and merchants, which in some respects are more valuable than letters of introduction to the first noblemen; because they will be able and inclined to inform the inquisitive traveller in more interesting matters than the latter: nevertheless, letters for great personages are always very acceptable, and may be of service on many occasions.

3. Travellers should even accept of Letters of Recommendation to the inferior class of people: a foreigner can never have too many friends; and it is a great thing to find a stranger, be he who he will, who has your interest and welfare at heart. Men of the inferior class may be very usefully employed for the traveller's instruction, provided he has sufficient knowledge of the world, and is capable of judging of the qualifications of every individual. Man deserves to be studied attentively in all stations of life; and the visiting of a cottage is often more instructive than frequenting a palace.

4. Letters of Recommendation to the higher class of Custom-House officers, may enable a traveller to get very essential instructions of them respecting commerce,

manufactories, and many other objects: some of them will even condescend so far as to communicate authentic accounts and valuable documents, which no other person could furnish.

On Inns.

1. A traveller should always lodge in the best inn, because, upon the whole, a good lodging will not cost him much more, than if he had chosen an indifferent one; and he will at least be better served, with an additional security to his property, which is not always the case in inferior inns, where people of all conditions, even to the lowest, resort, and the inn-keeper has not so great an incitement to support his credit. In many houses of less reputation of this kind, the expense will even be greater, than in those of the first rank, as the proprietors seize every opportunity to impose upon the richer order of strangers.

2. Travellers who go post, should never permit the postillion to drive them to such houses as he pleases; almost all of them have secret motives to prefer some to others; therefore it would be prudent to inquire of the post-masters, or inn-keepers of the first reputation, for a list of the best houses of accommodation, which are to be met with in the places through which you pass, whose veracity is at least more to be depended upon, than the drivers.

3. It is of the greatest importance to travellers always to have a room to be in alone, and never allow any person (well-known people excepted) to sleep in the same apartment, unless absolute necessity compels them. Foreigners cannot be distrustful enough towards strangers; many of them travel at the expence of the public, and insinuate themselves under various pretexts, grow familiar very soon, and are frequently the authors of the ruin of many young, unwary travellers, whose experience is not sufficiently ripened to open their eyes to their dangers. Many of those impostors will render essential services to foreigners, in order to captivate their benevolence; and those, of all others, are the most artful, and consequently the most dangerous.

4. Servants in the inns should never be hired, unless their honesty be well known to the landlord, who should always be questioned, if he is answerable for their fidelity.

5. As soon as travellers enter into an inn, they should immediately agree for the price of the room, dinner, supper, firing, &c. and never neglect this useful precaution, otherwise they will often be obliged to pay for their negligence in that respect an extravagant price, especially in Holland and Italy.

6. The best method of avoiding mistakes and double charges, is to pay daily the bill of the landlord, and to take a receipt for it [in a book:] this precaution will always render people more attentive and serviceable.

7. Many inn-keepers are remarkably inquisitive, and take particular delight in visiting and examining the traveller's trunk, during the time he is out, and particularly if you forget to agree: they make those researches in order to enable them to judge more properly of the circumstances, and consequence of their company; therefore it will always be prudent to

lock the trunk or boxes, and to conceal from them what could give them a too favourable idea of the traveller's importance.

8. In lonesome country inns, where safety ought always to be suspected, it will be better to permit the servant to sleep in the same room, and to have a wax candle burning the whole night: it will also be necessary before the traveller goes to bed, to visit behind it, and to look into the chests, under and behind them, and in all such places where concealment is easy. Pocket door bolts in the form of a cross, are applicable to almost all sorts of doors, and may on many occasions save the life of the traveller, where desperate attempts may be made by needy assassins; for this reason, it is recommendable to be always provided with a pair of those bolts. The safety of the doors should also be carefully examined; and in case of bolts not being at hand, it will be useful to hinder entrance into the room by putting a table, and chairs upon it, against the door. Such precautions are however less necessary in England, but on the Continent they are much more so.

9. It will not be amiss in such lonesome places, where accidents may oblige a traveller to remain the whole night, to show his fire-arms to the landlord in a familiar discourse, without acquainting him of his well-grounded suspicion of insecurity; and to tell him with a courageous look, that you are not afraid of a far superior number of enemies. Such stratagems have frequently had the most desirable effect. and may yet be practised with every promise of success.

10. Since it is very unwholesome to eat or to sleep in a room, the windows of which have been shut long before, it will be necessary to open them as soon as you enter into it; and it will not be superfluous to purify the air of the apartment, by throwing a little strong vinegar upon a red hot shovel, [and to make a fire in the chimney.]

11. Travellers never being sure whether the lodgers, who slept in the beds before them, were not affected with the itch, venereal, or any other disease, they should make use of a preventive of infection: a light coverlet of silk, two pair of sheets, and two dressed harts [or deer] skins put together, six feet six inches in length, three feet six inches in breadth, should be always carried along with them in the box. The hart's skin which is put upon the mattresses, will hinder the disagreeable contact, aud prevent the noxious exhalations. The hart's skin is to be covered with the traveller's own sheets; and if the coverlet be not sufficient to keep him warm, his coat put upon it, will increase the heat sufficiently. It will be necessary at rising in the morning to expose the hart's skin to the fresh air for five minutes before it is packed up again; and this precaution will alone be sufficient to guard against the unwholesome effects of bedding, much more dangerous in hot countries than may be imagined. If the traveller be not provided with these materials, it will not be prudent to undress entirely; the necklace, garters, girt, and any thing else, which hinders the circulation of the blood, must be untied, in order to prevent apoplectic affections.

22. A purse, or any temptation, should never be left on the table, because it stimulates distress some-

times to actions, which at other times would raise a blush, and prevents the commission of many crimes by the difficulty of perpetrating them, and of course many an ignominious fate.

13. In many countries the landlords are not answerable for the property of their company; therefore, if they are obliged to stay any time in one place, and intend to remain at the inn, they should ask the landlord, the very moment they make their agreement with him, whether their package is safe, and whether he is responsible for the consequences: in case he is not so, the most prudent way will be to deposit his valuables at a banker's, or the next person's in reputation, and to secure himself by receipt, which should always be demanded.

14. Foreigners, who remain for some time in a place, will save money, and be better accommodated, by taking private lodgings per week, or per month.

On Luggage.

1. Travellers who undertake a long tour, should only carry such baggage as is indispensably necessary.

Among the many inconveniencies of a too cumbrous baggage, the following deserve to be considered, viz.

First. The heavy expence of the carriage of it, which in some countries amounts to much more, than the passage of his person and servant.

Secondly. Unavoidable loss of time, and the difficulties of the Custom-Houses, particularly if the packages should unfortunately contain any contraband goods, which might happen very easily, because travellers cannot be always accurately informed of those articles, which may have been recently prohibited. That valuable time, which must be bestowed upon packing and unpacking; which, though the province of the servant, must often command the attention of the master, who may be anxious, lest his property should be shaken and destroyed by the violent motion of the carriage, if not carefully packed up; or lest any thing valuable should be left behind.

Thirdly. The disappointments; if sometimes the coach is damaged by the too great weight of the packages, or if the luggage on some occasions cannot be loaded upon the same coach, and consequently be hindered from following its owner.

Fourthly. The greater expence in the inns, where travellers are frequently charged according to the quantity of baggage and conveniences they carry with them.

2. A person who travels for improvement, is not supposed to be inclined to shine in foreign countries with the ostentatious magnificence of equipage; and therefore the traveller, if he means to proceed with either economy or convenience, should be very cautious of incumbering himself with a superfluous wardrobe.

3. The best way of carrying papers that are not bound like books, is to roll them very tight, to cover them with strong paper, in order to prevent them from rubbing against any thing, and to write the title of the contents upon the rolls, to know them again on all occasions.

4. Since it sometimes happens, that the custom-house officers (through mere wantonness) will throw papers carelessly out of the

trunks of passengers, it will be prudent to keep all the writings together in a large well defended port-feuille; a preference is to be given to those of Russia leather, because water cannot penetrate to, and destroy the contents: that leather is also best adapted to coverings of trunks, as its smell is obnoxious to vermin, and not liable to harbour worms, &c. incidental to hot climates.

5. Short and high trunks are preferable to long and low ones, because they can be put upon any carriage whatever. The solidity of a trunk is also one of its necessary qualities, it being, sometimes, most unmercifully handled by the Custom-House officers.

6. Travellers should never permit revenue officers to visit two trunks at the same time, as the owner's eyes and attention may be fixed on one, at the great hazard of his being pillaged by the other. Even, in these cases, experience often proves, that complaints do not produce redress.

7. It is sometimes very dangerous to accept of commissions, and sealed parcels, because they may contain forbidden goods.

8. A traveller should also forbid his servant to take contraband goods with him, because in case of an unfortunate detection, the servant would perhaps be arrested, or the master be obliged to give a considerable security, and to defend the cause of his servant in the proper court.

9. The trouble of having his trunk searched, can in some countries be obviated, by having it sealed by the Custom-House officers; therefore a traveller who dislikes those visits, should inquire whether this custom is allowed, and the trouble and pains dispensed with.

10. Bound books with stiff covers are liable to rub against, and greatly injure the baggage; therefore it will be prudent to have them lightly bound in leather, without its being stiffened by paste-board, and afterwards cut off smooth and even with the leaves. In case a person carries books with stiff covers, it will be advisable to place them at the bottom of the trunk as firm as can be, as a foundation, and over them with strong paper.

11. Among the requisites for travelling, the following will not be useless:

A case of instruments for drawing, measures, drawing paper, India ink.

A good watch, or exact time-keeper.

A mariner's compass.

A barometer.

A thermometer.

General and special maps of the country which the traveller visits, pasted upon linen, and rendered portable by folding.

A good telescope.

A dark lantern, wax candles, and a tinder-box.

Bolts suited to all sorts of doors.

On Sea Voyages.

1. Before a passenger agrees with a master of a vessel for the expence of a passage, he ought to inform himself respecting the age of the vessel, the cargo, the number the ship's crew, the quality of the passengers, and the destination of the voyage, &c. Each of these circumstances has its advantages and disadvantages, and deserves particular notice.

2. It is also a matter of importance to know whether that flag which the vessel carries, is respected by the piratical powers of Barbary, or not, if the course of the vessel should lie near to any such ports.

3. Some masters are excessively polite during their residence on shore, and remarkably otherwise when the passengers are on board; therefore it is necessary to inquire, before an agreement takes place, whether the master behaves well, and treats his passengers with politeness and attention.

4. If time can be spared, the traveller may sometimes travel remarkably cheap, therefore he should make an early inquiry concerning the price of the passage, if circumstances will permit. The masters are generally desirous of having passengers, and a man has a much greater opportunity of economizing by sea, when a number of vessels are bound to the same port; there is then a rivalship between them for passengers, and the consideration is, of course, proportionably moderate.

5. People, who endeavour to make the master believe, that their rank in life is not unimportant, must often pay dear for their ridiculous vanity, without meeting with better treatment; therefore, people of rank, who have a proper idea of the value of money, should, and will be on their guard in that respect.

6. There are different things to be observed with regard to each sea voyage, with which most travellers are unacquainted, and for this reason it will be advisable to consult the bankers, and those who are expert in sea affairs, relative to what ought to be observed concerning the agreement for their passage, as well as other important objects in voyages; for instance, if they intend to embark merchandize, or goods requiring certain precautions.

7. In long voyages it is necessary to do all that lies in our power to entertain a good harmony with the captain, officers, and fellow passengers; we ought also to give the same orders to our servants; and avoiding playing at cards, hard drinking, disputes, and giving offence. Small presents, given to the sailors, may on some occasions produce very desirable effect.

8. It would not be a bad scheme to have a letter of recommendation to be delivered on the arrival to the Consul of the country, of which the captain is a native; this would in some cases render him more attentive, if he was previously informed of this letter.

9. Those who wish to inform themselves of the method of working a ship, and of navigation in general, should be very attentive to every command the captain gives to the crew, and inquire into the reason of it. Perhaps it may not be difficult to obtain a copy of the ship's journal, which is an interesting matter for a passenger.

10. If passengers embark merchandize, they should not be too sincere in discovering their intentions concerning the disposal of them, because people may sometimes take advantage of the imprudence of such discoveries.

11. The example of the illustrious Captain Cook, who, during a voyage of three years and eighteen days, under every latitude, lost from his whole company of 118 men, only one man, is the greatest proof that the longest

voyages may be performed without prejudice to the health, if proper regulations are strictly attended to. It is at all times dangerous for the seaman, to indulge himself with too large a meal of animal food, and that even if it is fresh killed: *sour crout* is the best food that can be used, and at the same time an excellent antiscorbutic: portable soup is an exquisite nourisher of the body, and particularly if boiled up with vegetables: oatmeal, rice, and potatoes, are valuable articles: a proper quantity of cyder, perry, and vinegar, should by no means be forgotten, and the last should be added in a small quantity to almost every dish; the juice of oranges, lemons, and limes, form a very necessary part of a ship's stores.

12. The muscles of the body must be put in exercise every day; the passengers should assist the sailors in working the ship; bathe themselves at least once a week; attend particularly to neatness; be as often as possible on deck; expose their beds daily to the circulation of the air; smoke in damp weather; eat often and little at a time; sleep moderately; endeavour to be perpetually diverting themselves, and to keep up their spirits.

13. Those who are very liable to sea sickness, should keep towards the middle of the ship, where the motion is not so violent.

14. Persons who are subject to a costiveness in the body, should take such medicines with them as relax the bowels, without too much stimulation. They should also abstain from heavy food, and drink heating liquors sparingly.

15. Merchantmen, from 100 to 200 tons, have seldom any person on board who understands either surgery or physic; it will therefore be a most necessary caution, to provide such a small chest of medicines, as may be immediately relative to such accidents and maladies, as particularly attend on sea voyages.

16. A private lancet is also necessary for a traveller, because a lancet, which has been used in the bleeding of a scorbutic person, will infallibly infect any other man, who may be bled in a short time afterwards.

17. Persons of venereal habits should absolutely avoid any long sea voyages: and all those who intend to travel by sea, should peruse and consult the excellent work of Dr. Lind, on Diseases of Hot Climates, on the Scurvy, and on the Health of Seamen.

Miscellanies.

1. As the sudden death of the traveller may possibly occasion infinite distress and disputes in his family, he would consult his own tranquillity, if he committed to paper his peremptory will, before his departure from his native country.

2. A traveller who visits foreign countries for information, ought to be remarkably cautious, with regard to the choice of a companion for a long journey; if the person proposed has not exactly the same turn of mind, the same interest to pursue; and if he is not a good natured, active, and inquisitive man, he will be an intolerable burden, *a real obstruction to useful travels*, and convert the sweets of company into bitterness.

3. It is totally improper to hold

any discourse in foreign countries on religion, politics, or our own particular affairs, and especially with strangers.

4. Our curiosity becomes a virtue when its aim is purely instruction, and from a wish to be useful to our countrymen.

5. Those who are naturally destitute of judgment and prudence, become still greater fools by their travelling than they were before; it being impossible for him, who is a fool in his own country, to become wise by running up and down, which made Socrates say, he must change his soul, and not the climate, to become wise.

6. When you come into any company observe their humours, and suit your own carriage thereto; by which insinuation, you will make their converse more free and open. Let your discourse be more in queries and doubtings, than peremptory assertions or disputings. Sir I. NEWTON.

7. The art of pleasing in company, is not to explain things too circumstantially, but to express only one part, and leave your hearers to make out the rest.

8. There is no man but delights to be questioned in his own profession; when being moved by others, he may seem to publish his knowledge without ostentation.

9. A wise man counts his minutes. He lets no time slip; for time is life, which he makes long by the good husbandry of a right use and application of it.

10. A philosophic traveller looks upon his country as a sick friend, for whose relief he asks advice of all the world.

11. If a person limits himself to the knowledge of other people's discoveries, it will be an infallible cause, that he can make none himself. He who follows another, proceeds without an aim; for how should we find that which we are not in search of.

12. The duty of a man is to be useful to men, to a great number, if he can, if not then to a less; if that is impossible, then merely to his relations; if that be equally so, at least to himself.

In rendering himself useful to himself, he labours at the same time for others; for a vicious man not only injures himself, but also those to whom he might have been useful, had he proved virtuous: in the same manner, if we labour for ourselves, we labour also for others, because we form a useful member of society.

13. To a nation so particularly illustrious as the English, for the extent of their possessions, the stupendous scale of their commerce, as well as the free power of exercising those riches, in rendering active that sensibility which they intrinsically possess; it may not be amiss to address a few words in favour of those unfortunate men, who not only have the melancholy assurance of their present misery, by the suffering of it, but the additional accumulation of human woe, the idea of being forgotten, whilst labouring under it. By this unfortunate part of society, I allude *to the captives under the piratical states of the coasts of Barbary*; men, who far from rendering themselves unfortunate by their vices, become so perhaps in the very act of extending, or protecting the commerce of that country, to which they belong, and to whose continued protection they must be consequently entitled.

To reflect upon the misery of those objects, who perpetually present themselves to our eyes, and make a living and forcible call on our sensibility, is a worthy, is a philosophical virtue: but to turn a mindful eye on more *imagery* sorrow, which we know to be existing, though we cannot perceive it with our eyes, or receive its complaining tones in our ears; to impress the imagination with the bust of languishing and distant sorrow, so as to work our sensibility into action, is the highest prerogative of reason and intellect. Yet with that extent of power, and command of fortune, joined to that education, which many English travellers possess, such sentiments would neither be romantic, or such undertakings impossible. We should remember, as CICERO says, that there are two sorts of men, each of whom derive a totally different splendor from their expences; the one are mere prodigals, but the other justly deserve the title of generous; the first dissipate their property in entertainments, hounds, horses, and gaming: what will prove the remains of a similar profusion? A fleeting remembrance, perhaps total oblivion: but men, who are truly generous, consecrate their fortune to more noble purposes; *to the ransom of unfortunate captives, by pirates, &c. &c.*

14. This sentiment of SENECA is particularly noble, as contradistinguished from that idea of learning, merely for a personal accomplishment. I would only learn, says he, in order to be able to teach: the most interesting discovery would cease to have any charms for me, if I was only to be the repository of it. No, I would not accept of Wisdom herself, were it on the condition of keeping her secluded within myself. Possession is only rendered agreeable by participation.

TRAVELLER's JOY, HONESTY, VIRGIN'S BOWER, or GREAT WILD-CLIMBER, *Clematis Vitalba*, L. a hardy, indigenous shrub, growing in hedges and shady places, in calcareous soils, where it flowers in June and July.....It is easily propagated by layers or cuttings.

The fibrous stalks of this vegetable may be converted into *paper*: .....the whole plant is very acrid to the touch; on which account it is frequently employed as a caustic, and for cleansing old ulcers..... Both leaves and branches may, with advantage, be used in dying; and DAMBOURNEY obtained from the latter alone, a yellow decoction. .....BECHSTEIN observes, that the hard, compact, yellow, and odoriferous wood of this shrub, furnishes an excellent material for veneering.

TREACLE, the Common. See MOLASSES; and BEER.

TREACLE, the VENICE, or MITHRIDATE, *Theriaca Andromachi*, a celebrated medley of drugs, composed of 60 ingredients; prepared; pulverized; and, with honey, formed into an electuary: it was reputed among the ancients to be a specific against poisons, and was formerly employed in intermittent, malignant, and other fevers. At present, however, it is superceded by the *opiat electuary*, which consists of purified opium, 6 drams; caraway-seeds, long-pepper, and ginger, of each 2 oz.; and three times their weight of the syrup of white poppy, boiled to the consistence of honey. The solid substances are to be pulverized, and the opium first separately in-

corporated with the syrup, over a moderate fire; when the other ingredients should be gradually added. This composition is very powerful: the doses vary according to the age, sex, strength, and other circumstances; so that they ought to be regularly prescribed.

TREACLE-MUSTARD. See MITHRIDATE-MUSTARD.

TREACLE-HEDGE-MUSTARD, or Treacle Wormseed. See MUSTARD, the Hedge.

TREE, the largest of vegetable productions, rising to a considerable height, with a single stem.

Trees are divided into two principal classes, namely, *fruit*, and *timber* trees: the former includes all such as are raised chiefly, or entirely, for their edible fruit; an account of which, together with their mode of cultivation, the reader will find in alphabetical order, and also in the articles FRUIT-TREES, ORCHARD, &c....The second division comprehends those trees, the wood of which is employed in ship-building, machinery, or for other useful purposes, such as the OAK, LARCH, &c.; the culture of which has been discussed under those respective heads.....See also TIMBER.

The growth of trees is a subject of considerable importance; but few accurate experiments have been made, in order to ascertain their *annual* increase in height and bulk. ....In the *Philosophical Transactions of the Royal Society*, for 1788, Mr. BARKER states, as the result of his observations, that oak, and ash-trees, grow nearly in equal proportions, increasing about 1, or 1½ inch every year. He remarks, that when the annual growth amounts to one inch in height, a coat one-sixth of an inch in thickness will accrue to the tree; and as "the timber added to the body every year, is its length multiplied into the thickness of the coat, and into the girth," more timber is produced in proportion to the increasing thickness of the stem.

The health and vegetation of trees may be greatly promoted, by scraping them; by cutting away the cankered parts; and by washing their stems, *annually*, in the month of February or March..... Hence, Mr. FORSYTH, in his ingenious "*Treatise on the Culture and Management of Fruit-trees*," &c. recommends fresh cow-dung to be mixed with urine and soap-suds; and the composition to be applied to the stems and branches of fruit, forest, or timber trees, in the same manner as the ceilings of rooms are white-washed. This operation, he observes, will not only destroy the eggs of insects, that are hatched during the spring and summer, but also prevent the growth of moss; and, if it be repeated in autumn, after the fall of the leaves, it will kill the eggs of those numerous insects, which are hatched during that season and the winter; thus contributing to nourish the tree, and to preserve its bark in a fine and healthy state. A similar practice of washing and rubbing trees was devised many years since, by Mr. EVELYN, and Dr. HALES, who direct it to be performed first with simple water and a scrubbing brush, and afterwards with a coarse flannel: the trees, thus managed, throve uncommonly; and Mr. MARSHAM relates, that a beech-tree, between spring and autumn, increased 2 five-tenths inches in thickness, which was one-tenth of an inch more than an unwashed tree. Mr. FORSYTH's mixture,

however, is far preferable to common water; and, if the use of the latter fluid be attended with such beneficial effects, it may be rationally concluded, that the former will be productive of still greater advantages.

In common with other objects of the vegetable creation, *trees* are liable to a variety of diseases; which, if not timely attended to, eventually destroy them. Having already treated of such affections, under the heads of CANKER, MOSS, &c.; we shall in this place introduce a concise account of Mr. FORSYTH's improved method of curing injuries and defects in fruit, or the forest trees; for which HIS MAJESTY has graciously rewarded him; on condition that it should be published. Mr. F. directs all the decayed, hollow, loose, rotten, injured, diseased and dead parts, to be cut away, till the knife extend to the sound or solid wood, so as to leave the surface perfectly smooth. The composition (prepared in the manner described vol. i. p. 96, and rendered of the consistence of thick paint, by adding a sufficient quantity of soap-suds and urine) should then be laid on with a painter's brush, to the thickness of about 1-8th of an inch, and the edges *finished off* as thin as possible. Next, five parts of dry pulverized wood-ashes should be mixed with one part of bone-ashes, previously reduced to powder, and then put into a tin-box, the top of which is perforated with holes: the powder must be sprinkled over the surface of the composition, being suffered to remain half an hour for absorbing the moisture; when an additional portion of the powder should be gently applied with the hand, till the whole plaster acquire a smooth surface. As the edges of such excisions grow up, care ought to be taken, that the *new* wood may not come in contact with the *decayed;* for which purpose, it will be advisable to cut out the latter, in proportion as the former advances; a hollow space being left between both, in order that the newly-grown wood may have sufficient room to extend, and fill up the cavity, so that it in a manner forms a new tree. By this process, old and decayed pear-trees have, in the second summer after its application, produced fruit of the best quality and finest flavour; nay, in the course of four or five years, they yielded such abundant crops, as young healthy trees could not have borne in 16 or 20 years. By such treatment, likewise, large, aged elm-trees, all the parts of which were broken, having only a small portion of bark left on the trunk, shot forth stems from their tops, to the height of above thirty feet, within six or seven years after the composition had been applied..... Thus it appears, that both forest and fruit-trees may be *renovated*, and preserved in a flourishing state; while the latter may be rendered more fruitful than at any former period. We regret that our limits confine us to the present short account, and refer the reader to Mr. FORSYTH's *Treatise* above cited; which is illustrated with 13 elegant engravings.

[Under the articles FRUIT, ORCHARD, some observations on the subject of fruit-trees by the ingenious Mr. BUCKNAL were given, and the occasion of the present head is taken to introduce some additional and highly important remarks by the same valuable prac-

tical writer; from the *Transactions of the Society of Arts*, vol. 20, for 1802, on the VARIETIES of ENGRAFTED FRUIT-TREES.

"Some friends have requested that I would introduce another paper on the nature of the valuable varieties of engrafted fruits, as they are of opinion that the Essay in the 17th volume of the *Transactions of the Society* is not sufficiently extended for a subject so important to the fruit-growers, and those interested in the productions of fruits. As a proof of my willingness to make the orchardist as perfect as I can, I beg you to present my compliments to the Society, with the following elucidations.

"This is a subject in rural economy which ought to be much better understood than it is, in order to enable the planters to judge of the sorts proper to be planted, either as an article of pleasure, profit, or recreation; as much of the credit of the plantation must arise from judiciously choosing trees of the best, new, or middle-aged sorts, and not of the old worn-out varieties, which latter cannot, in the planting of orchards in common situations, ever form *valuable trees*, and must end in the disappointment of the planter.

"Engrafted fruits, I have before said, and I now repeat, are not permanent. Every one of the least reflexion must see that there is an essential difference between the power and energy of a seedling plant, and the tree which is to be raised from cuttings or elongations. The seedling is endued with the energies of nature, while the graft, or scion, is nothing more than a regular elongation, carried perhaps through the several repeatings of the same variety; whereas the seed, from having been placed in the earth, germinates and becomes a new plant, wherever nature permits like to produce like in vegetation; as in the oak, beech, and other mast-bearing trees. These latter trees, from each passing through the state of seedlings, are perfectly continued, and endued with the functions of forming perfect seeds for raising other plants by evolution, to the continuance of the like species.

"This is not the case with engrafted fruits. They are doomed by nature to continue for a time, and then gradually decline, till at last the variety is totally lost, and soon forgotten, unless recorded by tradition, or in old publications.

"Reason, with which Providence has most bountifully blessed some of our species, has enabled us, when we find a superior variety, to engraft it on a wilding stock, or to raise plants from layers and cuttings, or even to raise up the roots, and thus to multiply our sources of comfort and pleasure. This, however, does not imply that the multiplication of the same variety, for it is no more, should last for ever, unless the species will naturally arise from seed.

"Nature, in her teaching, speaks in very intelligible language, which language is conveyed by experience and observation. Thus we see that among promiscuous seeds of fruits of the same sort, one or more may arise, whose fruits shall be found to possess a value far superior to the rest in many distinguishable properties. From experience, also, we have obtained the power, by engrafting, of increasing the number of this

newly-acquired tree, can change its country, give it to a friend, send it beyond the seas, or fill a kingdom with that fruit, if the natives are disposed so to do. Thus we seem to have a kind of creative power in our own hands.

"From the attention lately paid to the culture of engrafted fruits, I hope we are now enabled to continue a supposed happily acquired tree, when we can find it, for a much longer duration than if such variety had been left in the state of unassisted nature; perhaps I may say for a duration as long again, or something more. After these sanguine expectations, I may reasonably be asked, to what does all this amount? for here there is no direct permanency..... and why? The *why* is very obvious....because the kernels within the fruit, which are the seed of the plants for forming the next generation of trees, will not produce their like. I allow they may do so accidentally; but nothing more can be depended on.

"For example, suppose we take ten kernels or pips of any apple raised on an engrafted stock: sow them, and they will produce ten different varieties, no two of which will be alike; nor will either of them closely resemble the fruit from whence the seeds were collected. The leaves also of those trees raised from the same primigenious or parent stock, will not *actually* be a copy of the leaves of any one of the varieties or family, to which each is connected by a vegetable consanguinity. I intentionally used the word *actually*, because a resemblance may be found, though not much of that is to be expected.

"I beg that what has been last mentioned may not be taken as a discouragement to attempts for raising new varieties. I was obliged to speak very strongly, in order to place the culture upon its true foundation. I think it need not be observed, that there is no acquiring a new variety, but through the means of a seedling plant; and therefore whoever wishes to succeed must attempt it that way, or wait till others in their plantations may more fortunately produce it.

"In chusing the seeds, that apple is most likely to produce the clearest and finest plants, whose kernels are firm, large, and well ripened. The size of the fruit is not to be regarded; for large apples do not always ripen their fruit well, or rather for cyder the small fruits are generally preferred for making the strongest, highest-flavoured liquor. And from what I have been able to collect in the cyder-countries, it is there the opinion, that an apple something above the improved crab promises the best success..... This advantage also attends the practice: if there are no valuable apples raised from that attempt, these wildings will make excellent stocks to engraft upon.

"Gentlemen who actually employ themselves in attempting to acquire new varieties, should remember that they ought to select all the sets from the bed of apple-quick, whose appearance is in the least degree promising, and plant them together, at such a distance as to allow each to produce its fruit, which will happen in about twelve, fifteen, or eighteen years. My friend Mr. Knight, who undoubtedly is the first in actual exertions for procuring these happily

acquired new varieties, has had two plants bear fruit at six years old, and one at five. The cyder-countries have offered several premiums for procuring new varieties, and some with good effect. Premiums have been given both to Mr. KNIGHT and Mr. ALBAN.

"When the new variety is to be raised from a valuable *admired* apple, I should recommend the placing these seeds in a garden-pot, filled with mould from an old melon-bed; carrying the pot into a retired situation near the water, and giving attention to run the plants to as large a size as is convenient within eighteen months. With this view, the pot should be placed in the green-house the first winter; and when the plants are afterwards to be set out in the spots, they should not be placed under the drip of trees, or much exposed to the winds.

"Two instances have been mentioned, the improved crab, and most admired apple; but prudence says, try all sorts, and something probably will arise; and the process is attended with little trouble or expense to a person who constantly resides in the country: yet, after all this scientific care, the apple may want flavour, and be in other respects nothing better than a common wilding.

"It is an undoubted fact, and worthy of observation, that all the different trees of the same variety have a wonderful tendency to similarity of appearance among themselves; and that the parent stock, and all engrafted from it, have a far greater resemblance to each other, than can be found in any part of the animal creation; and this habit does not vary to any extent of age.

"As an encouragement in attempting to increase the number of new valuable fruits, we can prove that the golden pippin is native English. The red-streak, a seedling of Herefordshire, if not raised, yet was first brought into notice by Lord SCUDAMORE, and was for a long time called *Scudamore's Crab*. The *Stire Apple* was accidentally raised in the forest of Dean, in Glocestershire, and took the name of *Forest Stire*. The cyder made from this apple was the strongest the country ever produced, according to any living record. The Haglo-crab, the best cyder fruit now remaining, was discovered in the parish of Ecloe, on the banks of the Severn; and about sixty or seventy years ago, many scions were taken from this tree by Mr. BELLAMY, and engrafted on seedling stocks about Ross. These are now grown old; and to ascertain the age of the variety, I went with CHARLES EDWIN, Esq. to Ecloes, in hopes of seeing the primigenious of this family. The proprietor of the estate acquainted Mr. EDWIN that it had ceased to bear, years ago, and was cut down. Those at Ross are but poor bearers now, and I should suppose the variety must be 140 years old, though MARSHAL, who wrote in the year 1786, mentions these trees were prolific, and he supposes the sort to be about eighty years old; but from present experience, it must be much more. The Tinton Squash-pear is of Gloucestershire; the Barland and Old-field were near Ledbury, Herefordshire. The two last pears clearly bear the names

of the two fields where they were raised. The Barland fell about six years ago, visibly from weight and longevity, which was supposed to have been about 200 years. There have been many other names of estimation handed down to us, though the realities are now totally worn out, and have ceased to exist. Can any better proof be desired, that engrafted fruits are not permanent, than the regret we feel for the loss of these old valuable fruits.

" To make my paper as short as convenient, I have dwelt only on the apple and pear: yet all the engrafted fruits are under the same predicament of the seed not producing its like, and the offspring in time falling into a nothingness of growth and bearing, though that space of time must certainly depend on the natural longevity and hardiness of the sort, soil, position, care, &c. All these are more fully expressed in the papers published in the different volumes of the transactions of this Society, and the two volumes of the *Orchardist*, wherein the whole system is extended, to form a rational culture for the management of standard fruits.

" It should be remembered, that as I am now alluding to the state of actual permanency, fifty years are to be accounted as nothing; and as often as we come to that point, we are compelled to resort to our first assertion, " That engrafted fruits are not permanent, they being continued from elongations, and not raised as a repetition of seeds." This is the only rational way as yet introduced of accounting for the loss of the valuable old varieties of fruits. Should a better system be introduced, I shall readily adopt it; but this sufficiently answers the purposes of the planter.

" Some years ago, from due investigation and thorough conviction, I propagated this principle; and it was published in the 17th vol. of the Society's Tranactions, in the following words: " All the grafts taken from this first tree, or parent stock, or any of the descendants, will for some generations thrive; but when this first stock shall, by mere dint of oldage, fall into actual decay, a nihility of vegetation.....the descendants, however young, or in whatever situation they may be, will gradually decline; and, from that time, it would be imprudent, in point of profit, to attempt propagating that variety from any of them. This is the dogma which must be received. I do not expect a direct assent, neither do I wish it; for it should be taken with much reserve; but it is undoubtedly true." These considerations should stimulate us in searching after new varieties, equal, or perhaps superior, to those of which we regret the loss.

" Observe, that from the time the kernel germinates for applequick, should the plant be disposed to form a valuable variety, there will appear a regular progressive change, or improvement, in the organization of the leaves, until that variety has stood, and grown sufficient to blossom and come into full bearing; that is, from the state of infancy to maturity; and it is this and other circumstances, by which the inquisitive eye is enabled to form the selection among those appearing likely to become

valuable fruits. But from that time the new variety, or selected plant, compared with all the engraftments which may be taken from it, or any of them, these shall shew a most undeviating sameness among themselves.

"It is readily allowed, that the different varieties of fruits are easily distinguished from each other by many particulars; not only respecting their general fertility, and the form; size, shape, and flavour of the fruit; but also the manner of the growth of the tree, the thickness and proportion of the twigs, their shooting from their parent stem, the form, colour, and consistence of the leaf, and many other circumstances, by which the variety can be identified: and were it possible to engraft each variety upon the same stock, they would still retain their discriminating qualities, with the most undeviating certainty.

"The proper conclusion to be drawn from the statement in the last paragraph, is this....that were any one to put the thought in practice on a full-grown hardy or crab stock, it would produce an excellent proof that engrafted fruits are not permanent. For if twenty different varieties were placed together, so that each might receive its nurture from the same stem, they would gradually die off in actual succession, according to the age or state of health of the respective variety, at the time the scions were placed in the stock; and a discriminating eye, used to this business, would nearly be able to foretell the order in which each scion would actually decline..... Should it also happen that two or three suckers from the wilding stock had been permitted to grow among the *twenty grafts*, such suckers or wilding shoots will continue, and make a tree after all the rest are gone. A further consequence would result from the experiment: among such a number of varieties, each of the free growers would starve the delicate, and drive them out of existence only so much the sooner. It must be observed, that this supposed stem is the foster-parent to the twenty scions, and real parent to the suckers; and those the least conversant with engrafted fruits know the advantage acquired from this circumstance. And here it is worth while remarking, that a Gascoyne, or wild-cherry, will grow to twice the size that ever an engrafted cherry did.

"By an experiment we have had in hand for five years, it will appear that the roots and stem of a large tree, after the first set of scions are exhausted or worn out, may carry another set for many years; and we suspect a third set, provided the engrafting is properly done, and the engrafter chuses a new variety. Now the Ripston pippin, of Yorkshire, is the favourite, as being a free grower and good bearer, with fine fruit. This, however, may be certainly depended on, that when a new apple is raised from seed, if a scion were placed in a retired situation, and constantly cut down, as a stool in a copse-wood, and the apple never suffered to fulfil the intentions of nature in bearing fruit, the practitioners of the following ages may secure scions from that stool, to continue the variety much longer. Hence, though I have written as much as is in my power against permanency, yet I have taken some pains to assure the

planters, that forecast, selection, pruning, cleanliness, and care, will make the orchards turn to more profit for the rising generations, than what they have done for the last hundred years.

"To place the nature of varieties in its true light, for the information of the public, I must maintain, that the different varieties of the apple will, after a certain time, decline, and actually die away, and each variety, or all of the same stem or family, will lose their existence in vegetation; and yet it is a known fact, and mentioned in the 17th vol. of the *Transactions*, that after the debility of age has actually taken possession of any variety, it will yet thrive by being placed against a southern wall, and treated as a wall-fruit. Who, however, can afford to raise cyder at that expence, except as matter of curiosity, to prove, that when the vital principle in vegetation is nearly exhausted, a superior care and warmth will still keep the variety in existence some time longer?

"It should be understood that the external air of Britain is rather too cold for the delicate fruits, which is the reason why, in the *Orchardist*, I lay such a stress on procuring *warmth* for the trees, by *draining*, *shelter*, and *manure*. It would be now lost time to attempt to recover the old varieties as an article of profit.

"If I have not expressed myself, in this *Essay on the Nature of Varieties*, with so much clearness and conviction as might have been expected, it should be considered, that it is an abstruse subject, very little understood, and requiring at first some degree of *faith*, *observation*, and *perseverance*. The prejudices of mankind revolt against it. They are not disposed to allow the distinction of nature; and they imagine, that, in the act of engrafting or multiplying, they give new life; whereas it is only continuing the existence of the same tree, stick, or bud. Observe what I said before: the seed of the apple, when placed in the earth, germinates, and unfolds itself into a new plant, which successively passes through the stages of infancy, maturity, and decay, like its predecessors. I might say, all created nature is similar in this respect; though, from the circumstance that varieties are much longer-lived than man, the plants have appeared to be possessed of eternal powers of duration: nothing sublunary however, which possesses either animal or vegetable life, is exempt from age and death.

"Within the last twenty years I have travelled many hundred miles, and conversed with the most intelligent men in each county; and I now want to convince mankind, for no other reason than because it is their interest so to believe, that there is in creation an order of beings (engrafted fruits) so formed, that we have the power of multiplying a single variety, to whatever number of trees we please; that the first set arises from a small seed; that the next and descendant sets are propagated by engraftings, or from cuttings, layers, &c.; and although these trees may amount to millions, yet, on the death of the primigenious or parent stock, merely from old-age, or nihility of growth, each individual shall decline, in whatever country they may be, or however endued with youth and health. I say they shall gradually begin to

decline; and in the course of time or of centuries, to those who would prefer that expression, the *whole variety* will scarcely have a single tree remaining to show what the fruit was. Let those who are not disposed to assent to the statement, ask themselves what is become of the old lost varieties? did they die, or did wicked men maliciously cut them up?

"I, who am firmly convinced of the truth of what I have advanced on this subject, have no doubt but that the same would happen by engrafting on the oak or beech, if the mast raised from the engrafted tree did not produce the like; for there the question turns.

"Is it not known that the woodman, in setting out his sapling oaks, always selects new seedling plants, and never continues one upon an old stool; and that if he should so blunder, that tree, from the stool, will neither have freedom of growth, nor the size or firmness of timber, equal to the new-raised plant.

"I wish I could persuade my friends, that, with the same attention with which the woodman acts, the planter is to raise his orchard from the young fruits which thrive in the neighbourhood, or are in health and full bearing in the country whence they are to be brought.

"The fruit-grower should look to selection, cleanliness, and care. To me it is a circumstance perfectly indifferent, whether he is to use Mr. FORSYTH's composition, Mr. BULINGHAM's boiled linseed oil, or my medication. I only maintain that the wounded parts of trees want something to destroy the insects and vermin, and heal the wood, from which the trees are kept in health.

"Let those who are blessed with fruit-plantations attend to their preservation, and not leave them to the state of unassisted nature."]

TREE-MALLOW, the SEA, or VELVET-LEAF, *Lavatera arborea*, L. an indigenous biennial, growing on the sea-shores, where it flowers from July to October....This being the only native species of eleven plants, belonging to the same genus, we shall briefly remark, that all the Tree-mallows deserve to be more generally cultivated, both in gardens and fields; not only for their elegant flowers, which abound with honey, but chiefly for the valuable material obtained from their fibrous stalks:....We learn from BECHSTEIN, that such stalks may, with equal advantage, be converted into *paper*, and pack-thread or *bass*, serving as a substitute for hemp.

TREFOIL, or *Trifolium*, L. a genus of fifty-five species, 16 of which are indigenous: of these we shall mention the following:

1. The *pratense*, or Common Clover;

2. The *medium*, *v. alpestre*, or Red, Perennial Clover;

3. The *procumbens*, *v. agrarium*, Hop-clover, or Hop-trefoil; and

4. The *repens*, or White Clover. Which see.

5. The *Melilotus officinalis*, or Melilot-trefoil. See MELILOT the Common.

6. The *arvense*, or Hare's-foot Trefoil, grows in sandy pastures, corn-fields, and chalky situations; where it flowers in July and August. This species is strongly aromatic; and, when dried, retains its odour for a considerable time:...it affords a grateful food to cattle;

and is, by BECHSTEIN, recommended as a valuable substitute for oak-bark, in *tanning* leather.

7. The *fragiferum*, or Strawberry Trefoil, thrives in moist meadows, chiefly in the vicinity of London, where it flowers in August....This perennial vegetable is industriously cultivated by the Greenlanders, who propagate it by seed, and also transplant the stalks, which thus attain the height of *seven* feet. Its whitish and reddish flower-heads are nearly globular, and slightly compressed on the upper surface. The whole plant affords as nutritive food to cattle as the Common or Meadow-clover.

TREFOIL, the COMMON BIRD'S-FOOT, or *Lotus corniculatus*, L. an indigenous perennial, growing in meadows, pastures, heaths, and road-sides, where it flowers from June to August.....This plant is eaten by cows, goats, and horses; but, according to LINNÆUS, is not relished by swine or sheep; tho' it is propagated in Hertfordshire as pasturage for the latter animals. ....Dr. ANDERSON strongly recommends it to be cultivated for cattle; and Mr. WOODWARD remarks, that it may be raised to great advantage: as it attains a considerable height in moist meadows, and makes good hay.......Its flowers, when dried, acquire a greenish cast: in which respect, they resemble those of the plants producing INDIGO: it is, therefore, probable, that they may be advantageously employed for obtaining a substitute for that expensive dyeing material.

According to BRADLEY, an infusion of the seeds, flowers, and leaves of the Common Bird's-foot, in wine, operates as a diuretic; and at the same time tends to allay the irritation of the urinary canal.

TROY-WEIGHT, is that mode of weighing certain commodities; in which the *pound* contains *twelve* ounces, each of them being divided into *twenty* penny-weights and the latter into *twenty-four* grains each: on the contrary, a pound of *avoirdupois* consists of *sixteen* ounces; so that each oz. has *eight* drams, or drachms; each dram *three* scruples; and each scruple, *twenty* grains.......See also AVOIRDUPOIS and WEIGHT.

[The proportion of a pound, avoirdupois to a pound troy, is as 17 to 14.]

TRUE-LOVE. See HERB-PARIS.

TRUFFLE, or TRUBS, *Lycoperdon tuber*, L. (*Tuber cibarium* of Dr. WITHERING,) is a species of puff-ball, which grows under ground, without any roots or the access of light; and attains a size of from a pea to the largest potatoe. In Britain, however, it is of a globular form, resembling that of a large plumb: and, when young, its surface is whitish; being interspersed with elevated dots, the centre of which contains a brown powder, similar to that of the common PUFF-BALL: as it becomes old, the colour turns black....This species of fungus may be searched for in hilly forests, which have a sandy or dry clayey bottom, at the depth of four or five inches in the earth; though it seldom exceeds four or five oz. in weight, while those produced on the Continent, frequently weigh from eight to sixteen ounces....It is one of the most wholesome and nutritive of the esculent fungi, and is generally discovered by means of dogs, which are taught to scent it; so that, on

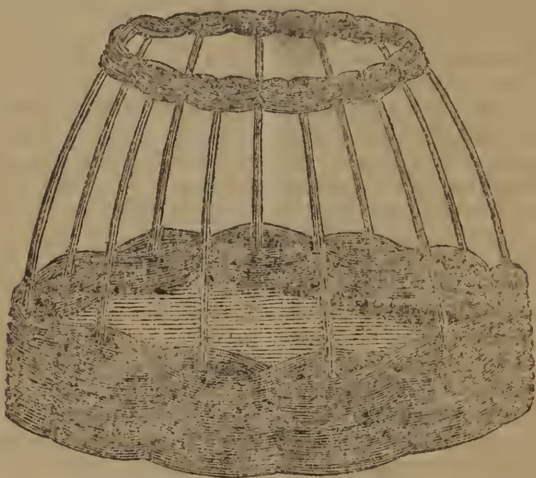
smelling the truffle, they bark, and scratch it up.....In Italy, it is likewise rooted up by pigs, which are either furnished with a ring around their snout; or, it is taken from them by an attendant.

Truffles are highly esteemed at the tables of the luxurious, where they are served up, either roasted in a fresh state, like potatoes; or, they are dried, sliced, and dressed as ingredients in soups and ragouts. The most delicious are internally white. and possess the odour of garlic.

TUBE-ROOT. See MEADOW-SAFFRON.

TUMBREL, a machine employed chiefly in the county of Lincoln; for the purpose of giving food to sheep, during the winter.

In the 4th vol. of the "*Repertory of Arts*," &c. we meet with a descriptiction of a contrivance which is equally simple and useful: we have, therefore, been induced to give the annexed Cut, representing its structure.



It consists of a circular cage or crib, which may be made of willow, osiers, or similar pliant brushwood. The whole is ten feet in circumference, being closely wattled to the height of one foot, above which it is left open for the space of about 18 inches; when it is again wattled to the height of 8 or 9 inches; an opening, 18 inches broad, being left at the top, for the purpose of putting in turnips, or other provender. The staves, forming the skeleton of the machine above represented, are 10 inches apart, so that 12 sheep may feed at one time in each tumbrel.

Considerable advantages are derived from this method of feeding sheep; as it greatly reduces the expense of provender, which is thus prevented from being soiled

with dung, or trodden under foot. In such a state of separation, the stronger animals cannot drive away the weaker sheep; each being secured by the head, while they are eating. Farther, the construction of the tumbrel being attended with no difficulties, it may be readily procured, and be daily conveyed to any part of a farm : if proper care be taken, this utensil may be preserved in constant use, for eight or ten years.

TUMOR, or SWELLING, in animal economy, denotes an enlargement or preternatural tumefaction of any part of the body; and is either of an *indolent* nature, such as CANCER, SCHIRRUS and SCROPHULA ; or *inflammatory*, as occurs in the female breast, in chilblains, and various other local affections....With respect to the latter, we refer to the article INFLAMMATION; and, as most of the former are distinguished, either by the cause from which they arise, or by other circumstances, whence they have received particular denominations, we shall in this place only give a few directions, relative to the treatment of indolent tumors in general.

When swellings of this nature gradually appear on any part of the human body, and are not attended with either pain or inflammation, the mode of discussing them entirely depends on their situation. Thus, when the glands are swoln, cold astringent fomentations, or saponaceous and mercurial plasters, conjoined with cold-bathing, especially in sea-water, will generally be attended with good effects. If the tumor be situated on muscular or fleshy parts, warm fomentations have often been found of service ; on bony or tendinous parts, gentle friction, and afterwards moderate compression, are in most cases sufficient to remove the obstruction.

[TUPELO TREE, *Nyssa*, L. a genus of trees, comprehending 3 species, all of which are natives of the United States.

1. *N. Aquatica*, Virginian water Tupelo Tree, grows in swamps in Carolina and Florida. The berries are nearly the size of a small olive, and are preserved in like manner by the French inhabitants on the Missisippi, where it abounds, and is called *Olive Tree*. The timber is white and soft when unseasoned, but light and compact when dry, which renders it very proper for making domestic table utensils.

2. *N. Ogeche*. The Ogeche Lime Tree. This tree was brought from Georgia by Mr. BARTRAM, to the neighbourhood of Philadelphia. It is a tree of great singularity and beauty, growing naturally in the water. The fruit is nearly oval, of a deep red colour, of the size of a Damasane plum, and of an agreeable acid taste, from which it is called the lime tree.

3. *Nyssa Sylvatica*, *Upland Tupelo Tree*, or *Sour Gum*. This species grows naturally in Pennsylvania, and New-Jersey. The timber of this tree is close grained and curled, and does not split easily ; and therefore much used for hubs of wheels for waggons and carriages. It also is much used by economists for back-logs of fires, from its incombustible nature.

The *Sweet Gum*, is a very different tree : it is the *liquidamber*, *styraciflua* of Linnæus, the leaves of which resemble the maple, and

the wood dry, light and inflammable.]

TURBITH, or TURPETH, an officinal drug, being the bark from the fleshy roots of the *Convolvulus Turpethum*, L. an exotic species of the Bind-weed, growing in Ceylon.

Turbith is imported in oblong pieces, which are of a brown, or ash-colour externally, and whitish within. The best is brittle; contains a large portion of resinous matter; and is at first of a sweetish taste; but, when chewed, it becomes pungent and nauseous..... This drug is occasionally employed as a purgative; but is by no means safe, or uniform, in its operation.

TURBITH - MINERAL, or YELLOW - VITRIOLATED QUICKSILVER, a medicinal precipitate obtained by cautiously mixing eight parts of vitriolic acid with four of purified mercury; and distilling the whole to dryness, in a retort placed in a sand furnace. The white calx, on being reduced to powder, and thrown into warm distilled water, assumes a yellow colour; and becomes tasteless after repeated ablutions.

Turbith-mineral is a powerful emetic, and has been given with frequent success, in doses of from $1\frac{1}{2}$ o 6 or 8 grains, to robust persons, who were afflicted with leprous diseases, and glandular obstructions, that had resisted the power of other medicines. It has also been recommended, in doses amounting from six grains to a scruple every day, in cases of *hydrophobia*; and some instances have occurred, in which it not only prevented madness in dogs that had been bitten, but also effected a cure, after the disease had actually taken place. Lastly, the water, in which this mineral is washed, has been used externally for lotions, in the itch and other cutaneous affections; but such practice ought never to be adopted without proper advice; as it may be attended with danger.

TURF, a brown or blackish fossil, consisting of a rich earth combined with the fibrous roots of vegetables, mineral oils, &c.

Turf differs from *peat*, only in its harder consistence; the latter being obtained from peat-bogs, and the former is dug out of more solid ground, such as dry commons, on which cottagers exercise the *right of turbary*, by prescription: both species are chiefly used as fuel, in those countries where coal and wood are scarce. After the turf or peat are consumed, their ashes are employed either as a MANURE, or they may be advantageously strewed on land infected with CHAFERS. (See CHAFER.) Farther, it appears from the experiment of M. SAGE, that turf may be charred, or reduced to a state of cinder, in the same manner as CHARCOAL; and thus serve as an excellent substitute for the latter; because it not only burns with a more intense heat, but is also of a longer duration.

TURKEY, or *Meleagris gallopavo* L. a bird originally from North America; but which has long been domesticated in Britain; it has a caruncle both on the head and throat; the breast of the male being tufted. When irritated, the feathers of this part are remakably erected; the prominence on

the forehead is relaxed; and the bare spots of the face and neck become uncommonly red.

Turkies subsist on grain and insects: early in the spring the female frequently wanders to a considerable distance from the farm-yard, for the purpose of constructing her nest; where she deposits from 14 to 17 white eggs, marked with redish or yellow freckles; but seldom produces more than one brood in a season. Great numbers of these birds are reared in the North of England; and, towards autumn, hundreds at a time are driven to the London market, by means of a scarlet shred of cloth, fastened to the end of a stick; which, from their antipathy to this colour, serves as a whip.

Turkies, being extremely delicate fowls, are much oppressed by *cold;* hence the Swedes plunge their chicks into cold water, soon after, or at least on the same day, when they are hatched; then force them to swallow one whole pepper-corn each; and restore them to the parent bird. Thus, they are enabled to resist the impressions of the severest winters and their growth is not retarded.

Young turkies are liable to a peculiar disorder, which frequently and speedily proves fatal: on inspecting the rump feathers, two or three of their quills will be found to contain blood; but, on drawing them out, the chick soon recovers; and afterwards requires no other care than common poultry.

Turkies are highly esteemed, on account of their delicate flavour; for their flesh is not so rank as that of either geese or ducks, and is likewise more nutritious.

TURMERIC, or *Curcuma*, L. a genus of exotic plants, comprehending two species, namely; 1. The *rotunda*, having a round fleshy root, similar to that of ginger; and 2. The *longa*, with long yellow roots, which spread to a considerable extent. Both are natives of India, whence their roots are annually imported by the East-India Company, paying 2*l.* per cent. according to their value; and a farther duty of, 2½d per lb. for home consumption.

Turmeric has a weak, though agreeable smell; and a bitterish, pungent taste: it is naturally of a deep saffron-colour, which it communicates to watery infusions.... This drug is by the Indians, principally employed for seasoning rice, and other culinary preparations....It is reputed to be aperient, and of considerable efficacy in the jaundice; but is chiefly consumed in dyeing the finest yellow colours, which are also the least permanent; and giving a brighter, though perishable, shade to scarlet cloth..... See also YELLOW.

TURNEP, TURNIP, or KNOLLES, *Brassica Rapa*, L. an indigenous biennial plant, growing in corn-fields, and chiefly in their borders; where it flowers in the month of April.

There are many varieties of the turnip, which are cultivated, both for feeding cattle, and for culinary purposes; but we shall enumerate only the principal, namely:

1. The *Oval*, *Common White-stock*, or *Norfolk* Turnip.

2. The *Large Green-topped* Turnip attains a considerable size, and is very sweet and soft; but, growing *above* the ground, it is liable to be injured by severe frosts.

3. The *Purple-stock* resembles

the first variety, excepting that its size is somewhat smaller; the rind is of a dark-red or purple colour; and its pulp is also more close and firm, than that of the Common Norfolk turnip. It withstands the severity of winter, without receiving material injury, and is more succulent in the spring; but, not being relished by cattle so well as either of the two preceding varieties, it is not generally cultivated.

4. The *Ruta-Baga*, or *Swedish* turnip, is one of the most valuable roots of the kind. Its inside is either white or yellow; which colour, however, does not affect its quality: it is more hardy than either of the preceding varieties, and suffers no injury from the most intense cold....As this turnip, when allowed to *seed* near the Oval, or Norfolk white, produces numerous varieties; it has been conjectured, that a new sort may, by a judicious intermixture, be obtained, which will probably acquire from the one, a sufficient degree of hardiness, to resist the winter; and, from the other, an increase of size, as well as a quicker growth.

5. The *Hastings* is a new variety, imported several years since, from Tibet, in Asia, by Governor Hastings.....This plant has not been hitherto cultivated to any extent; but it appears, as far as we can ascertain, to be one of the most wholesome and profitable roots of this species.

Turnips, in general, succeed better in light soils, consisting of a mixture of sand and loam, than in very rich or heavy lands: the crops of the latter will be rank, and run to flower at too early a period of the spring; though their weight may not be perceptibly diminished.

These roots are raised from seed, which ought to be changed annually, or every second year, without exception; as it is apt to degenerate, and the quality of the roots will consequently be impaired. The season for sowing, varies according to the time of feeding: thus, if the turnips be intended for feeding cattle from December to February, the seed must be committed to the ground from the middle of May to the end of June; but, in case they be designed to supply food till May, it should not be sown before the latter end of July, or early in August.

The quantity of seed depends upon the method of culture; for, if it be *broad-cast*, 2 lbs. per acre will be necessary: but a more advantageous mode is that of Drilling, in rows three feet asunder, which requires only one pound of seed. Although we have given an account, vol. ii. pp. 172-180, of the most valuable *Drill-machines*, yet as two implements of this description have lately been contrived, for the express purpose of drilling *turnips*, we have been induced, for their remarkable simplicity, and practical utility, to furnish our readers with a complete account and delineation of such improvements.

In the year 1801, the *Society for the Encouragement of Arts*, &c. granted a premium of 10 guineas and a silver medal, to the Rev. T. C. Munnings, for his invention of a Turnip-drill, of which he communicated a model, accompanied with a narrative of experiments, to determine "the comparative advantage of the drill or

Mr. T. A. Knight's Drill Machine.

Fig. 1.

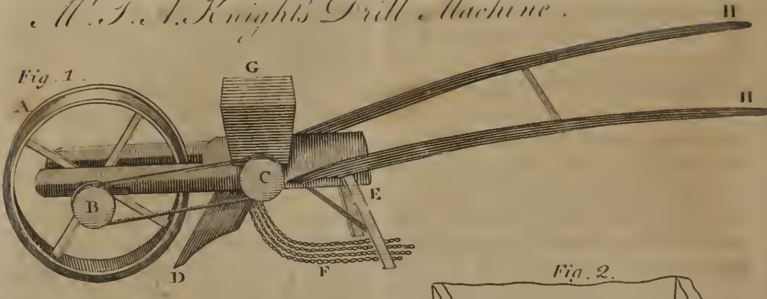


Fig. 2.

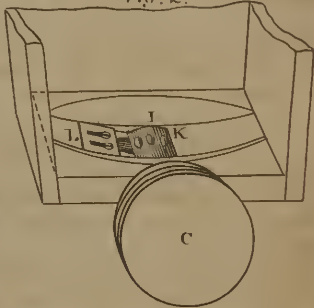


Fig. 3.

Revd. T. C. Munning's Turnip Drill.

Fig. 4.

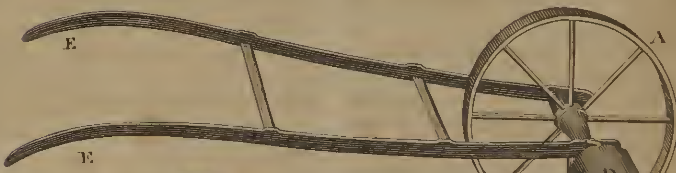
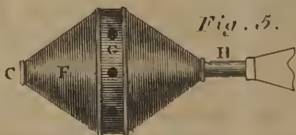
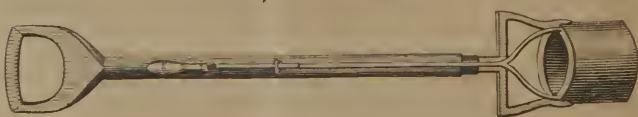


Fig. 5.



Transplanter



Shallus sc.

broad-cast method, in the cultivation of turnips."....It consists of a tin box, resembling the shape of a barrel, which is fixed to the axis of a wheel about 22 inches in diameter, and vertical with such box; dropping the seed during its revolutions, through certain small apertures, which are in the middle of the barrel, about fourteen inches asunder.

Description of the Turnip-Drill, invented by the Rev. T. C. MUNNINGS.

Fig. 4....A, the wheel with an iron rim.

B, the tin barrel, or seed-box, which is fixed to the axis of such wheel.

C, the opening, through which the seed is introduced into the box; and which is afterwards closed by a cover.

D, a semi-circular plate of tin, the design of which is to exclude all impurities from the seed-box.

E, E, the two handles of the machine.

Fig. 5....F, represents the seed-box on a larger scale.

G, the holes in the tin box, through which the seed falls upon the land.

H, part of the axis of the wheel, to which the seed-box is fixed.

Mr. MUNNINGS considers his drill for turnips, as much superior to any other, from the single circumstance of its depositing the seed so *instantly* after the plough, as entirely to preserve the good effects of the first evaporation: and he conceives, that such evaporation contributes to the uniform vegetation of minute seeds. Thus, in the six acres of his drilled plants, there was not a deficiency of six square yards; though, on three acres of broad-cast, before rain fell, not one half, perhaps not one-third, of the seeds vegetated. He is fully persuaded, that the drill-method, in the cultivation of turnips, will, in all seasons, be superior to the broad-cast; but, that the very great and striking difference between the two methods, will most effectually be preserved in a season of *uncommon drought.*

The second drill-machine is, that contrived by THOMAS ANDREW KNIGHT, Esq. of Elon, near Ludlow; on whom the *Patritic Society* above mentioned, in 1801, conferred their silver medal.

Description of Mr. KNIGHT'S *Drill-Machine for Sowing Turnip-seed.*

Fig 1.....A, is an iron wheel; which, running on its edge, formed by two concave sides, makes the groove, in which the seeds fall.

B, a wheel, that moves on the same axis as that marked A, and turns the wheel C, which gives out the seed, by means of a strap.

D, the tube, through which the seed passes, and falls into the channel made by the iron wheel.

E, are the feet of the implement.

F, represents six lengths of a jack-chain, which Mr. KNIGHT finds to cover the seed remarkably well; and which he believes to be preferable to any kind of harrow; as it can never become obstructed by the loose straw generally occurring on the surface of land recently manured.

G, I, the seed-box.

H, H, the handles of the machine.

Fig. 2, is a section, on a larger scale, of the seed-box G, in *Fig.*

2.....The wheel marked C, is the same in both figures: it is fixed on the axis of the cylinder I, the surface of which is perforated with holes, as at K, for the distribution of the seed. Such cylinder revolves within a groove, at the bottom of the box; in which it is so firmly fixed, that no seed can pass through, without being delivered by the holes K.

L, is a small brush, rubbing against the cylinder, for clearing out any seeds that may remain in the holes....The seeds fall into the tube beneath the cylinder, whence they are conveyed into the furrow or channel, made by the indenting rim of the iron wheel; being then covered with soil by the loose chains above described.

Fig. 3.....A front view of the wheel, exhibiting its edge: the angle forming that edge must be made more or less acute, and the strength of the machine in proportion to that of the soil. Mr. KNIGHT has, sometimes, added weights of lead over the axis of the wheel; but he observes, that they will seldom be required; having tried the instrument on different soils, with equal success. Great advantage may be derived from sowing turnips with it, at the time when horses, now commonly employed for such purpose, are otherwise engaged. In this respect, a few days are frequently of importance; as the plants in consequence of fortunate rains, obtain a remarkable superiority over those which have been sown a few days later.

The labour of using this machine is so easy, that a workman usually drills four statute acres, or somewhat more, in one day; the rows being at the distance of 18 or 20 inches, and the plants six inches apart in the row. It is necessary either to harrow the ground *across*, or to roll it, previously to the instrument being used, that the labourer may see the rows he has made: but, Mr. KNIGHT remarks, that he always found the crop to succeed better, after the roller, than after the harrow, even in very strong lands.

When the turnips have *five* leaves, they must be hoed, and thinned so as to be six inches apart, whether sown by the drill or broad-cast method: in the course of another month, or sooner if the weather prove wet, the hoeing ought to be repeated, and the plants be left (according to some agriculturists), at least 14 inches asunder. These roots must likewise be kept clear of all weeds; for which purpose a horse-hoe is usually employed: but, as many farmers, in distant parts of the island, may not be provided with that implement, we have annexed the following figures of a plough, employed chiefly in the county of Roxburgh, for the express purpose of cleaning turnips. It consists of two ploughs, which are of a size considerably less than those in common use: each of them without the small stilt or handle, but joined together with wooden and iron bars; so that both instruments may be fixed at any requisite distance, for taking the earth from turnips: on being brought closely together, they form a *common double-mould-board-plough*, that may be advantageously used for passing between the drills, and forming the ridges.

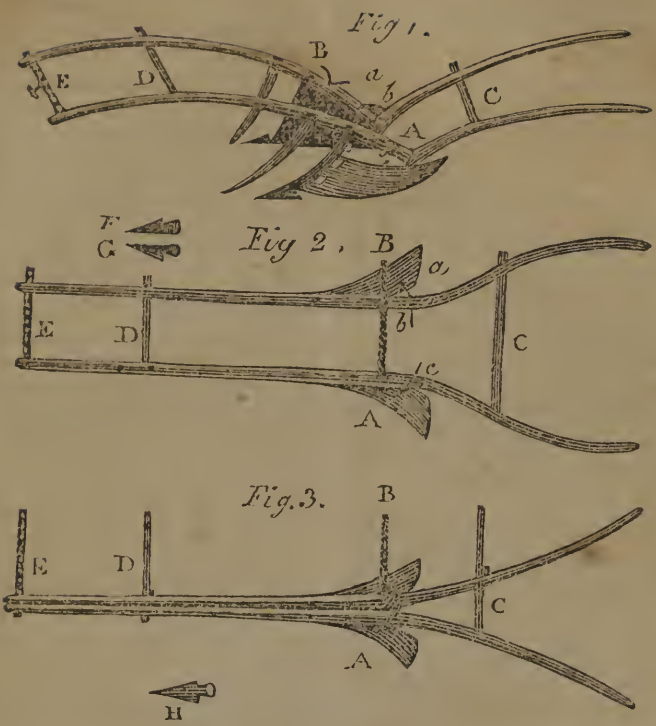


Fig. 1, is a view of the plough, when ready for removing the soil from turnips (as it appears to a person standing on one side and towards its front); each beam having its distinct coulter, and feathered sock.....A, B, is a strong iron rod, formed into a screw, for the greater part of its length : this screw being affixed to the left hand beam at A, passses through the other beam, to which it is attached by means of two nuts with handles, marked *a* and *b;* and, when firmly screwed on each side of such beam, it fixes both at any distance required.

C, and D, are two wooden (or sometimes iron) bars, that are fixed in a similar manner to the left-hand beam, and passed through the other, where they are secured by wedges.

E, is a bar of iron, which is likewise inserted through both beams; being perforated with holes for fixing the bridle, by which the plough is drawn. The mould-boards are fastened to the sheaths by hinges, and are placed at any requisite width, by means of two iron pins, *f* and *g;* which, descending through the beams, pass through holes made in a thin iron

bar, fixed to the inside of each mould-board.....F, and G, are the two feathered socks.

Fig. 2, is a bird's-eye view of the same implement; in which the manner of altering the mould-board may be more clearly perceived. When the plough is employed in this way, it is drawn by two horses.

Fig. 3, is another view of the plough, from above; when the two beams are brought into contact, forming one double-mould-board-plough. In such case, the coulters are removed; the two socks are taken off; and that marked H, is put upon the points of both the sheaths, so as to clean the bottom of the furrow between the drills, while it serves to keep the two sheaths firmly together. The machine is now drawn by one horse.....The advantages derived from the use of this implement are great; as double the work of a common plough may thus be performed; and, as the machine does not, like the latter, lay the soil too much upon the drill....Sometimes, the Roxburgh plough is made with two additional moveable mould-boards, which are suspended by hooks; when the two beams are separated, as in *Fig.* 1, and 2. In this case, it will set up two drills at once; though it ought then to be made proportionably stronger, and to be drawn by two horses.

In November, 1801, a patent was granted to Mr. WILLIAM JACKSON, for a machine or drill designed to sow turnips, By this contrivance, turnip, rape, or similar small round seeds, may be drilled at any requisite distance: it may be farther adapted to the width of any furrow; and, by means of certain ingenious machinery, the seed may be deposited either under such furrow, or upon the ground. Our limits not permitting us to detail the constituent parts of Mr. JACKSON's drill, we can only state, that his implement unites cheapness with utility, and may be purchased for the small price of 1*l.* 11*s.* 6*d.*: hence we refer the reader to the 16th vol. of the "*Repertory of Arts*," &c. where the specification is illustrated with an engraving.

[The cultivation of turnips being considered of the first consequence in England, the Editor has deemed it important to state the latest improvements in that branch of husbandry, and to determine by fair comparison, the crops and cost, of the drill and broad-cast system. The first paper he shall select, is by M. J. BOATE, of Atherstone, upon Tower, and inserted in the 7th vol. of the *Trans. of the Soc. of Arts*.

"I fixed upon a twenty-acre piece, which was trench-ploughed for a turnep-fallow in the beginning of November, 1786, and dunged about Christmas following; afterwards ploughed three times, at proper intervals; also harrowed occasionally, and drilled with turneps, in rows twelve inches apart: the turneps were hoed three times, and produced an exceeding good crop, which was eat off by sheep in autumn: the land was afterwards trench-ploughed, four acres of which were drilled with four bushels of wheat; the same day four acres adjoining (the soil as similar as possible) were sown broad-cast with ten bushels of wheat, in order to make the comparative experiment.

"In the first week of April, 1788, the drilled wheat was hoed, and repeated the last week in the

same month; at which time the broad-cast was also hoed, with hoes of a proper size for the purpose, in order to give it every advantage: at harvest the crops of the respective four acres were separately reaped, each laid by itself in the barn, and separately thrashed, in order to ascertain, with the greatest accuracy, the difference of each produce. The result as follows; which also appears in the numbers 14 and 15 of the next ascertainments.

"Produce of four acres drilled, one hundred and nineteen bushels, one gallon, and four pints; produce of four acres broad-cast, ninety-four bushels, two gallons, and four pints....difference in favour of drilling, twenty-four bushels, seven gallons, which, at five shillings and sixpence per bushel, together with six bushels of seed saved by drilling, which cost me seven shillings and four pence halfpenny per bushel, amounts to nine pounds one shilling and three farthings. Deduct the extra-expences of drilling four acres at sixpence, and extra-hoeing at eighteen pence per acre, amounting to eight shillings, the net profit in favour of drilling will be eight pounds thirteen shillings and three farthings, or two pounds three shillings and three pence per acre.

"Toward the latter end of April, 1788, when the four acres drilled, three weeks after it had been hoed, gained such a decided superiority over the adjoining four acres broad-cast, which was self-evident by the strength of the plants, and being of a darker green, I determined to give the broad-cast every advantage: accordingly I had it as well hoed as was practicable to be done; which is, in fact, doing all that can be done for any broad-cast crop: this evidently improved the four acres broad-cast; otherwise I am decidedly of opinion, that, in case the hoeing of the four acres broad-cast had not taken place, but the weeds had been suffered to grow, the four acres drilled would have exceeded the four acres broad-cast more than one third; from whence I cannot see that I have any reason to make the least abatement respecting my assertions in a former letter, that I was apprehensive I should lose sixteen pounds by sowing four acres broad-cast.... Hoeing of broad-cast corn is nothing new with me, or others; it is commonly done in Berkshire, and other places; and was my uniform practice for twelve or thirteen years of my broad-cast farming: but as it cannot be performed so effectually in a broad-cast crop as in a drilled one, it is unreasonable to expect equal advantages from it, since, after all the care and pains that can be taken in hoeing a broad-cast crop, there will be many weeds left growing, being so mixed and interwoven with the corn, as not to be cut up without cutting up the corn also. I must own, that neither the produce of the above four acres drilled, nor the produce of the four acres broad-cast, came up to my expectations, considering the due preparation of the soil. This I attribute entirely to the dryness of the season: there is nevertheless this inference to be drawn from it, that in whatever proportion any drilled crop may suffer in a dry season, for want of moisture, the broad-cast will suffer still more by reason of the seed being deposited at improper depths; for the plants of those seeds in particular which were sown too near the surface of

the land, will be almost parched up for want of moisture in a dry season.

"In my attempts to ascertain the difference between drilling and broad-casting, I am somewhat surprised it should never occur to me before now, to ascertain the difference in quality as well as quantity of grain produced from both methods of culture, by weighing equal quantities of each. In the above comparative experiment the drill has no material advantage over the broad-cast; a bushel of the latter being nearly equal in weight to a bushel of the former: this I attribute to the circumstance of the broad-cast crop being hoed, particularly as my neighbour Mr. Wm. Greenway informs me, that, from the result of his experiments of last year, in order to ascertain the difference between drilling and broad-casting, the grain of his drilled crop was superior to that of his broad-cast, not only in quantity, but also in quality, two pounds weight per bushel; and his broad-cast crop was not hoed: from whence I conclude, that the grain of his broad-cast crop was imperfectly vegetated, and not brought to full maturity, by reason of the injury done to it by the weeds, or for want of the soil being pulverized by the hoe.

"In one of my early experiments in drilling, I found that hoeing the intervals between the rows or drills was indispensably necessary; otherwise, where land was found foul with weeds, or caked upon the surface, so as to exclude the air from the fibres of the plants, or hinder the extension of the fibres in the soil, the advantages of drilling were, upon the whole, not worthy of notice. On the contrary, and by the same experiment, I found that, by hoeing the intervals, cutting up the weeds, and pulverizing the soil at seasonable times, a surprising and almost incredible advantage might be derived: this left me no alternative but that of declining the drill system altogether, except for beans and peas, at wide distances, where the horse-hoe, or shim, might work; or of submitting to the formidable expence of hand-hoeing the intervals of drills at nearer distances. To the advantages gained by hoeing, I was at that time no stranger; and I was not long in finding out that the value of seed saved by drilling, would more than defray the expences of hoeing; and the hoeing, I was confident, would insure a superior crop: from whence I concluded that the only obstacle that lay between me and success, in the drill system, upon a large scale, was the difficulty, if not the impossibility of procuring a sufficient number of labourers to perform the business of hoeing, just at the time required: and, as I apprehended, so it has turned out: the difficulty in procuring a number of hands in due time, and, in ticklish seasons, perhaps at an hour's notice, is very considerable; exclusive of the attention required in seeing that the work was done in a husbandmanlike manner, and the fear of the crops of corn growing too high to admit of the use of the hoe: the weeds at the same time committing such horrid depredations, without a possibility of retrieving the loss, must needs create no little anxiety of mind."

The second paper is by Mr. John Exter, inserted in the *Trans. Society of Arts*, vol. 16.

"A six-acre field of light sandy loam, from four to five inches deep, on a clayey substratum, which had been previously exhausted by white straw crops, and which I rent at 30*s*. per acre, though I consider it too dear in the price (the soil of which differs but very little in any part of the field), was ploughed from a barley stubble, in December, 1796, and was cross-ploughed the last week of May, scufiled across in June, four acres of which was manured with dung, and the remainder by the sheepfold. The part dunged had 120 horse-loads of rotten stall dung, 250 cwt. each, per acre; the part folded had at the rate of 1200 sheep per night, per acre. The whole field was ploughed again as soon as the manuring was completed, and on the 15th of July was sown across the different manurings, as follows: half the field broad-cast, one pound of seed per acre; of the remainder, drilled with COOKE's drill machine, with about half a pound of seed per acre, at eighteen inches distant from row to row; and the remainder with the same machine, three quarters of a pound per acre, in rows, at a foot asunder. The weather being favourable, with frequent showers, the whole field was planted sufficiently well for a crop; but the different parts varied much in their progress in getting into the rough leaf, and consequently escaping the danger of the fly..... The drilled, at a foot apart, seemed to lose the smallest number of plants; the drilled at eighteen inches, the next; and the broad-cast, the largest number; and consequently was, in many places, patchy, with intervals of four or five feet without any plants at all. There was also a degree of vigour observable on the part manured with dung, much superior to that manured by the sheepfold; the former got into the rough leaf many days sooner, and saved a much larger number of plants..... The whole crop was hand-hoed once; the broad-cast cost 8*s*. 2*d*. the drilled part 5*s*. 10*d*. per acre. A large quantity of seed weeds, which had been carried out with the dung, had shown themselves previous to the hoeing, and many sprung up again after, and were more particularly apparent in the broad-cast part of the field, and in the intervals where that crop had failed: the drilled part had not nearly as many weeds, from the turnips growing faster, and keeping them under, or perhaps their being more effectually cut up by the hoe, in the intervals between the rows. The part of the field manured with dung was all superior in its growth to the part folded on, throughout the autumn, and is at this time as three to two better. The superior advantage of drilling to broad-cast is more particularly apparent in the part of the field manured with the fold; and the twelve-inch intervals are also in this part more superior to the eighteen-inch intervals, than on the part manured with dung.

"February 27, 1798, four square perches of each of the different modes of sowing, were measured off by the minister of the parish, and the overseer of the poor, who is a farmer, and rents 400*l*. per annum in the said parish, in presence of several other persons; and the turnips drawn from each portion were separately weighed, their tops and tails having been previously cut off; and the pro-

duce of clean roots was as follows:

The four perches drilled at a foot,	962
The four perches drilled at 18 inches,	888
The four perches broad-cast,	555

"I think it right here to remark, that the four perches of the broad-cast fixed on were more fully stocked with good plants than the general average of the broad-cast part, these four perches having scarcely a failing spot. The broad-cast part in general being somewhat patchy, and the drilled pretty uniformly filled with plants, over all the field; I am certain, had the whole of each portion been weighed, the drilled would have exceeded the broad-cast more than two to one. The bulbs of the drilled turnips were rounder, and more nearly of a size, than the broad-cast, which I think must be owing to the more equal distances their roots had to feed in; and perhaps to this circumstance, more than any other, it owes its extra produce.

"The following remark on the cultivation of turnips have been made by myself, in succession of practice for fifteen or sixteen years; and I therefore take the liberty of adding them, as I can declare them founded on observation.

Soils for Turnips....Sandy loams, in good heart, are most favourable to their growth, though they will thrive well on strong loams, if they are not wet: but on clayey, thin, or wet soils, they are not worth tilling; the crop is always poor, and the land injured by them.

Preparation of the Soil for them. Plough three or four times; the first time before Christmas, and harrow or dig the land as often as it is weedy; and always previous to the ploughings, manure should be laid on immediately before the last ploughing. If the land is dry, plough it quite flat; if the soil is disposed to be wet or springy, gather it into beds or ridges, sufficiently high to keep it dry; or gather it, after manuring, into four furrow ridges, and drill on the top of each ridge; and plough the intervals twice during the growth of the crop, first ploughing off from the sides of the ridges, and next back again, up to them. Hand-hoe the tops of the ridges.

"Paring and burning the turf, at first breaking up old swards, is the best preparation in many situations. After paring and burning, plough twice, the first time very thin; then spread the manure, and turn it in with a full-depth furrow, on which sow immediately, and harrow once to cover the seed.

"*Manuring*.....Land cannot be too rich for turnips, especially if the crop is to be carted off from the land. The best manures I have experienced are as follow: I place the best first, the others in succession, according to my opinion of their merits; 1. dung, 2. soap-ashes, 3. sheepfold, 4. lime; the last and least to be depended on. I think it is of very little use in securing the young plant from the fly, but it promotes the after-growth of the crop. I think all the nostrums offered as preservatives against the fly are mere quackery. Good manuring, with fresh dung, just rotten enough to plough under, is the best; spread your dung just fresh before the plough, and as soon as possible after the last ploughing.

"*Seed and seed process, &c.*..... The tankard turnip the best for early feed, the white round stock for the middle season, the green top for late spring feed. Sow new seed in preference to old: if broad-cast, one pound and a half per acre; and harrow once at a place to cover it. I have often mixed my seed in damp saw-dust, for the sake of increasing its bulk, and distributing it more regularly, allowing half a bushel of saw-dust to the quantity of seed per acre sown broad-cast. If you drill, half the seed is sufficient, and deposit it from one inch and a half to two inches deep; if the soil is damp at the time, the better. The placing turnip-seed deep in the soil accelerates the growth of the plant, by giving it moisture, and gets it sooner out of the power of the fly. The best distance for the rows appears to be at one foot apart, except for the tankard turnip, in very rich soils, to be eaten off early, where perhaps eighteen inches may be equally advantageous..... I have several times drilled my turnips in very foul land, two rows at a foot asunder, with an interval of two feet, the narrow interval hand-hoed, and the wide interval twice ploughed with the common plough; and this far exceeded the broad-cast in the same field, both in fallow and crop. Never harrow fine, or roll the land after sowing the seed: the more small clods are left on the surface the better, provided they do not exceed the size of a turkey's egg..... Horse-hoe the drilled, and hand-hoe the broad-cast crops, and both at an early period, viz. as soon as the plants expand their leaves as wide as a crown-piece. By early hoeing the weeds are checked, and the crop forwarded in growth. The operation may be repeated if weeds come on again. In general, a second hoeing is necessary. From repeated trials, I am satisfied that drilling turnips is preferable to sowing them broad-cast on every soil where the land is not so declivous as to prevent sowing with a drill, and even on lands too stony to admit the horse-hoe: it distributes the seeds more regularly, and deposits it to any depth required, by which it is often secured from the fly, by being accelerated in its growth; and, in soils that will admit the horse-hoe, it lessens the expense of hoeing more than one half: and, besides producing a better turnip-crop, it prepares the land better for the crop of corn that follows it than any hand-hoeing whatever. Besides, turnips always come to hoeing in the busy time of harvest; and when you cannot spare them to hand-hoe at all, a man, boy, and horse, will horse-hoe five or six acres per day.]

In the 4th vol. of the *Letters and Papers of the Bath and West of England Society*, we find an account of a peculiar and very successful cultivation of turnips; by J. KIRKPATRICK, Esq. of the Isle of Wight. He states, that a Mr. CUBITT GRAY, of Southrepps, Norfolk, never harrows his land, till it is to be ploughed again; but leaves it as open as possible, in order to *warm* it; conceiving that land can never be too warm or dry for turnips; in consequence of which, he has uniformly for the last 16 years, had the best crops; even though the sowing season was dry.....Notwithstanding every precaution, it frequently happens in turnip-fields, that large spots re-

main barren: we have, therefore, subjoined the following representation of a simple instrument invented by Mr. GRAY, for the purpose of filling up such vacant spaces from the adjoining parts of the same field; and which has also been employed for transplanting other vegetables. [See plate facing page 205.

The handle A, must be held with the left hand; and the short handle B, drawn up with the right. The *transplanter* should next be put over the vegetable intended to to be taken up, and forced into the ground with the foot: it is then to be twisted round, and carefully drawn up, so that the earth may adhere to the root. A hole should, in the mean time, be made by an assistant, furnished with a similar instrument, for the reception of the turnip; the root be conveyed in the first transplanter, and deposited in the cavity: after which, the right hand being kept steady, the left must be gradually raised; when the earth and plant will be left in the hole undisturbed.

Turnips are subject to the depredations of numerous insects, and particularly to those of the following, namely:

1. The BLACK CANKER; which see.

2. The BLACK FLY; an insect which may be prevented from attacking turnips, by sowing them between beans; or, by adding one-fifth part of radish-seed to the former, and rolling it into the ground. The steeping of turnip-seed in water, for 24 hours previously to sowing, is likewise believed to secure the future roots against injury; but the most efficacious method appears to be that adopted by the late Earl of ORFORD (*Annals of Agriculture*, vol. xiv.): it simply consists in immersing the seed in *train-oil*, during the night before it is sown. The roots do not acquire any ill taste; and seven gallons of such oil are stated to be sufficient for steeping a quantity of seed that will cover 200 acres...See also vol. iii. p. 55.

[*The following methods are lately recommended.*

First. To a quart of turnip-seed, add one ounce of brimstone finely powdered......put them both into a bottle large enough to afford room to shake them well together every day, four or five days previously to sowing, keeping the bottle well corked.

Second. Take such a quantity of elder leaves, as, when bruised, will yield juice sufficient to cover the turnip-seed you intend to sow, in which let it soak about 12 hours, the next day mix it with bruised leaves, and a small quantity of allum....then sow all together.

Turnip-seed is generally covered with a brush-harrow: Take elder bushes for this purpose.

If, notwithstanding these precautions, the fly should attack the young plant, draw elder bushes gently over them.

If turnip-seed is sown while it rains it does not require to be harrowed in, and the young plants shoot so strongly that they soon gain strength beyond the power of the fly.]

3. The SLUG, to which we refer.

4. The *Worm*, an insect feeding upon the root; in consequence of which, the plant gradually withers, and at length perishes.....No cer-

tain remedy has been hitherto devised for destroying this depredator; but it has been conjectured, that its ravages may be prevented, by manuring the soil with soap-boiler's ashes.

The turnip is one of the most valuable roots raised for culinary, or economical purposes...Its young tops, when boiled, afford a good substitute for greens; and, though nutritive, they are somewhat flatulent; which property, may, however, be corrected by the addition of pepper and vinegar. More wholesome, and easy of digestion, are the *Swedish Turnips;* but they should not be long kept in heaps; being thus apt to become rank, and, consequently, still more indigestible.....Mixed with wheaten flour, and properly baked, the *Ruta-baga* furnishes a nutritious kind of Bread...See vol. i.

Farther, *Knolles*, are very useful as a *fallow-crop;* and for fattening cattle of every kind. Thus, if sheep be fed with them in the manner before directed, see Sheep, they will thrive uncommonly, and their flesh will acquire a delicate flavour. With the mercenary view of obtaining the greatest profit, some sheep-breeders in Lincolnshire extract the fore-teeth of *culled* ewes, and turn them into the field, where they speedily fatten on the tops, without biting the roots. Turnips likewise afford an invigorating food to horses; and, when cut into small pieces, these animals will be induced to eat chaff, and other provender with a good appetite. Such food not only preserves them in health, but also saves the expense of corn: their coats are thus rendered perfectly smooth; and, if the *Ruta-baga* be used, it is eminently calculated to cure the *grease*.......Cows devour both the tops and roots of turnips, with equal eagerness; and, as their milk is apt to acquire a peculiar flavour from the former, the butter obtained from it may be rendered perfectly sweet, by mixing one quart of boiling water with eight of the new milk, immediately on its arrival in the dairy; after which it may be put into the usual vessels, to stand for cream.....See also vol. i.

Lastly, the roots of turnips being of such extensive utility, different means of preserving them from frost, and decay, have been contrived: and of which the following appears to be the most successful. After drawing the turnips in February, and cutting off the tops and tap-roots (which may be given to sheep), Mr. Varlo directs them to be exposed on dry soil, for a few days: a layer of straw should next be spread on the ground; and, on this, a stratum of turnips, about two feet thick: other layers of straw and roots are then to be formed alternately, till the top be carried to a point; the edges of the straw being turned up, to prevent the turnips from rolling out. The whole should now be covered with straw, which will serve as a thatch; one load being sufficient for 40 tons of roots. Thus managed, the turnips will be effectually sheltered against the frost; and may, for several months, be kept in a sound state.

Turnip-cabbage, and

Turnip-rooted Cabbage. See Cabbage.

TURNING, is the art of forming wood, ivory, and other hard bodies into an oval or round shape, by means of a Lathe.

This art was carried to great per-

fection among the Romans; and is of such importance at present, that it materially contributes to the perfection of many other branches in mechanics. The machine ought to be fixed in a light place, at a sufficient height to allow the turner to inspect his work, without endangering his eyes by the sudden separation of chips.

Previously to fixing the wood, bone, ivory, or metal, on the lathe, it ought to be rounded with a small hatchet, with a file, or with a plane; and the centres of the surfaces at each end should be ascertained: for this purpose, it will be advisable to lay the piece of wood upon a board; and, after opening a pair of compasses nearly to half the thickness of the piece, one of the legs must be attached to the board, and the point of the other brought into contact with one of the ends of the piece to be *turned*. Four equidistant arches must then be described at the circumference of such end, which should intersect each other within; and, if these be accurately made, the point of intersection will be the centre. The middle of the opposite extremity ought now to be determined in a similar manner; a small hole be made in both; the points of the puppets inserted; and the piece firmly fixed, so that it may be easily revolved.

Next, the cord ought to be passed twice round the piece, and adjusted to the strap connected with the wheel: when the *rest* is placed as closely to the work as possible, the turner moves the wheel, by means of the *foot-board*; then presses a *gouge*, or other chissel, against the wood, in an horizontal direction; and thus, by the steady, well-regulated application of his tools, gives it the requisite form. After having completely turned the work, it requires to be polished either with the skin of the Shark, the Rough Horse-tail, or other substance adapted to the nature of the material, thus manufactured.

TURNSOL, or TURNESOL, a valuable dyeing drug, which is prepared chiefly in the village of *Grand-Galargues*, near Montpellier, from the *Croton tinctorum*, L. in French called *Maurelle*: this plant produces a round stalk with many leaves, and seldom exceeds nine inches in height....It is therefore erroneous, when our voluminous contemporaries uniformly assert, on the authority of M. NISSOLE, that *Turnsol* is obtained from the tops of the *Heliotropium tricoccum*, L. and though it may be true, that such drug is occasionally manufactured from the latter vegetable, yet the genuine article is doubtless the result of the following process.

Toward the latter end of July, or early in August, the flowering tops of the *Maurelle*, or Litmus-Croton, are expeditiously collected, and bruised; when the dark-green sap is expressed into stone vessels, with the addition of urine. Linen or woollen rags are next dipped into this liquor, and immediately dried in the sun; after which they are suspended for seven or eight hours, over casks containing stale urine, quick-lime, and alum, till they acquire a blue or dark violet colour; and, if necessary, again immersed in the juice, dried, and treated as before. Thus prepared, they are packed, and sold by the French under the name of *Tournesols en drapeau*. These blue shreds are chiefly employed for tinging wines,

cheese, linen and paper. When infused with distilled water, they afford an excellent test; for, on pouring a little of this solution into any liquor containing an acid, it will instantly turn *red.*

[The above account is left entire, though it is now known, that the Dutch prepare Turnsol from that kind of lichen called orchil, *(Lichen-Rocella,)* or, when that cannot be procured, from the large oak moss.]

TURPENTINE, a transparent, resinous substance, which exudes naturally, but is chiefly obtained by incision, from various species of the pine-tree; and is divided into *four* kinds, namely:

1. The *China*, or *Cyprus* turpentine, is derived from the Pistachia-tree: it is of a thick consistence, resembling that of honey; has a fragrant smell; and a bitterish, pungent taste.

2. The *Venice* turpentine, which exudes from the Larch-tree, has a strong smell, and a hot, disagreeable taste: it is less viscid than any of the other turpentines, and generally of a clear whitish or yellowish cast.

3. The *Strasburgh* turpentine possesses an agreeable aromatic odour, but an uncommonly bitter taste; is neither so thick as the first species, nor so thin as the second; but clearer, and less tenacious than either; being commonly of a yellowish brown colour..... it is imported from Germany.

4. The *Common* turpentine is extracted from the spruce fir; it is of a dark brown colour; of the consistence of honey; and has the most disagreeable odour and taste, of all the different species.....Considerable quantities of this drug are prepared from the resin, in Britain; but, as they are insufficient to supply the market, is is imported from America, and other countries.

All the turpentines yield, on distillation, an essential oil, which is extremely pungent. On account of their diuretic and tonic properties, they are often successfully prescribed in calculous complaints. The Venice turpentine is preferably recommended as a diuretic, and detergent: while those of Chios and Strasburgh are used as corroborants. The common sort is mostly employed as an ingredient in the plasters used by farriers; and its essential oil, obtained by distillation, is consumed partly in the preparation of GIN, and partly by house-painters; as likewise for the different varnishes in the floor-cloth, umbrella, and many other manufactures. Lastly, when combined with honey, this oil is supposed to afford a powerful remedy in rheumatic affections.

TURPETH. See TURBITH.

TURTLE, the COMMON, or GIANT TURTLE, *Testudo midas*, L. a native of the West-Indies and South-America. This amphibious animal attains to a prodigious size; being sometimes three yards long, and six feet broad; weighing from 5 to 800 lbs. The female digs numerous holes in the sand, where she annually deposits more than 1000 eggs, on which she broods during the night. The young, however, are chiefly hatched by the sun, and frequently become a prey to ravenous birds.

Turtles are taken, either by turning them on their backs, when on land; or, by hunting them in boats, and killing them by a kind of spear, similar to that employed for taking whales.....Their flesh is

highly esteemed, particularly the belly, which is of a delicate white colour, resembling veal; and the *green* fat possesses a peculiar odour. The whole is very nutritious, and of a soft gelatinous nature; but, containing a large portion of strong fat (which is exceedingly unwholesome when rancid or tainted), it should never be eaten without salt, pepper, or other spice, and ought to be carefully avoided in *every form*, by convalescents, and those whose digestive powers are reduced....As the turtle, however, subsists chiefly on vegetables, its flesh is uncommonly palatable and wholesome, especially in a *salted* state: thus, it forms a considerable article of trade in the West-India Islands, where the natives convert the upper shell of this animal into canoes, troughs bucklers, &c.

Mock-Turtle Soup, may be prepared in the following manner:.... First, a calf's head must be scalded, without stripping off the skin; when the gristly or horny parts should be taken out, and cut into small pieces. These ought next to be washed, wiped, and put into a vessel containing four quarts of strong broth, prepared of 7lbs. of beef, a calf's foot, a shank of ham, with an onion, carrot, turnip, some thyme, and other pot-herbs: to which may farther be added, a little parsley, sweet marjoram, and savory, cut small; together with some pounded cloves and mace, a little Cayenne pepper, a few young onions, some chopped mushrooms, and half a pint of Madeira wine. All these ingredients are to be slowly stewed, till the liquor be reduced to two quarts; when a little broth, thickened with flour, should be gradually added, together with the yolks of two eggs, and carefully stirred, till the whole nearly boils: it is now suffered to stew for another hour, at the end of which, it is fit for use. Such is the method of making this expensive soup, which is so highly gratifying to the vitiated palates of those, who prefer the luxuries of the table, with their concomitant evils, to temperance, health, and longevity.

[TUTENAG, Zinc, according to Sir GEO. STAUNTON, is extracted from a rich ore, or calamine.... The calamine from which tutenag is thus extracted, contains very little iron, and no lead or arsenic, so common in the calamine of Europe. Hence the Chinese zinc is more beautiful than European zinc.]

TUTSAN, or PARK-LEAVES, *Hypericum Androsæmum*, L. is an indigenous perennial, growing in woods and moist hedges, where it flowers from July to September. This vegetable deserves to be more generally known; as it may be advantageously employed for the preservation of CHEESE, in the manner already stated, vol. ii. p. 97. Farther, as the leaves of the Tutsan assume a red colour, and sometimes yield a red juice, we conceive, they might be converted to some useful purpose, either as a pigment, or dyeing material; by treating them according to the processes described under the heads of COLOURING MATTER, vol. ii. and TURNSOL.

TYPE, a term employed by printers, to denote the letters used in printing; and which includes not only large CAPITALS, SMALL CAPITALS, *Italics*, and Lower Case &c., but likewise all the points,

figures, and other marks that are adopted in TYPOGRAPHY. See PRINTING.

Numerous improvements have, during the last century, been made with a view to expedite the business in this noble art. Among these, we cannot omit to notice, first, a contrivance by Mr. WILLIAM GED, in 1731; who formed a plate, of any character required, for every page or sheet of a book, from which plate he printed, instead of using single types for every letter, as is practised in the common method. Thus, the expence of printing was lessened, while the work was performed with more accuracy, beauty, and uniformity; but such practice was relinquished in the course of a few years, and has not been revived in Britain.

In the year 1784, a patent was granted to Mr. HENRY JOHNSON, for a new mode of printing, termed *Logography*, which consists in employing types expressive of *whole* words instead of those corresponding to *single* letters. In consequence of this alteration, Mr. J. observes, that the compositor is less liable to error; the type of each word being taken up with as much facility as single letters; and, when a sheet is printed off, such types may be more easily *distributed*. Lastly, it is asserted, that the expense or number of types in *logography*, does not exceed that required by the common mode of printing: we doubt, however, the expediency of this contrivance; and believe, that much greater advantages might be derived from casting *syllables* instead of whole *words*; because the former occur more frequently, and may be so arranged as to follow in alphabetical order, in proportion to their more or less frequent recurrence.

We cannot conclude this article, without mentioning the *stereotype*, lately introduced into France, by M. M. DIDOT and HERHAN; being doubtless one of the greatest improvements in the art of printing. Their process appears to be analogous to that of Mr. GED above related; the *form* being first composed, and carefully corrected; when the types are so firmly cemented, or soldered, as to resist the action of the press. Thus, correct and beautiful copies of works may be expeditiously taken off; an advantage, which is of the greatest importance in printing accurate editions of the Greek and Roman classics.

TYPHUS, a malignant contagious fever, attended with remarkable prostration of strength. Great disputes have prevailed among physicians, respecting the real nature and proper denomination of this malady; but, as the names by which it has been distinguished, mostly depend on the different degrees of violence, observed in its progress, and a variety of other circumstances, we shall briefly describe this dangerous fever.

Beside the usual febrile symptoms, a typhus is characterised by uncommon dejection; langour; interruption of the animal functions; and weakness of pulse: the tongue appears moist and clean, or covered with a thin white coat; the urine is pale. After a few days, the patient feels anxiety; depression at the pit of the stomach; and becomes delirious; till at length he is seized with stupor, which frequently terminates in a profound sleep: the excretions by stool and urine pass off involunta-

rily; and about the 14th, 17th, or 21st day, the scene is often closed with convulsions; though sometimes protracted to a later period.

Causes:....Contagion, or infection, by contact with diseased persons; excessive evacuations of every kind; depression of mind; a studious life, attended with nocturnal watching; long subsistence on crude and impure food; putrid effluvia of poisons and hospitals, arising from corrupted substances, stagnated waters, &c.

The event depends entirely on the greater or less violence of the symptoms, and the relative tendency to putrescence: hence, the following are deemed favourable signs: a gentle moisture over the body especially when succeeded by a moderate looseness; and the strength of the patient appears to be supported by the remedies applied. On the other hand, delirium; continual watchfulness; sickness; and convulsions; cold or clammy sweat, emitting a cadaverous odour; all these are inauspicious omens, especially when the patient lies on his back with his knees drawn up, and the body gliding downward. If the spots, that generally appear about the 11th or 14th day, be of a dark and livid hue, great danger may then be apprehended.

Cure:....Abstinence from all animal food, and an immediate removal from a contaminated atmosphere to a clean, dry, and airy situation. If the alimentary canal be oppressed by crudities, either an emetic, or moderate laxative, according to circumstances, should be timely administered. Mild sudorifics, in conjunction with tonics, especially the Peruvian bark, and vegetable acids, conveyed in copious draughts of diluents, with the addition of wine, have generally been found beneficial. If the head be much affected, blisters, applied to the neck, sometimes afford relief. Should the patient, about the 7th, 11th or 14th day, feel oppression, anxiety, and uneasiness, an eruption on the neck, chest, or back, may be suspected; in which case, gentle cordials will be proper. Coliquative sweats may be counteracted by the use of generous wine and bark. When the appetite returns, the patient should first subsist on thin, chicken and other broths; weak jellies of sago, hartshorn, &c. Thus, slight attacks of this fever may often be removed. But, when it rises to a degree of malignity (such as is often experienced in hot climates, on account of the noxious exhalations during the night), it will be advisable to attend first to the necessary evacuations; after which, the bark, æther, and camphor, should be freely administered with red or Rhenish wines, fixed air, and other antiseptic remedies: if the eyes appear wild, and the speech be quick, blisters, ought to be immediately applied to the [arms and legs]. Cold bathing, however, has often been attended with more salutary effects. According to the late theory and practice of Dr. Reich, the liberal use of the mineral acids, especially of the muriatic, or *spirit of salt*, has proved of the greatest service; but neither this powerful medicine, nor bathing or affusion with cold sea-water, can with safety be ventured upon, without medical advice; for no disease demands more professional sagacity and judgment then the true typhus.

Consistently with our promise [article FEVER], we shall only add, from recent experience, that the *internal* use of this acid, when *large* doses of it are required, is liable to many serious objections, which must ever prevent its general adoption. But we are nevertheless convinced that it may, in all cases, be safely applied in the form of liniments, fomentations, and baths: thus, a very large, and much larger proportion than by swallowing it, may be daily, nay, hourly, introduced into the system, especially in the earlier stages of the disorder, before the patient's strength is too much exhausted.... Farther, we are of opinion, that in *desperate* cases, where a valuable life is at stake, the muriatic acid, sufficiently diluted, may be introduced into the stomach, by means of the tube contrived for that purpose by Mr. SAVIGNY. Such attempts, however, can be justified only by the most pressing circumstances, and should never be made without medical assistance.

U. V.

VALERIAN, or *Valeriana*, L. a genus of plants, comprehending 22 species; 4 being indigenous, and of which the following are the most remarkable:

1. The *locusta*, or LETTUCE VALERIAN. See CORN SALAD.

2. The *officinalis*, or GREAT WILD VALERIAN, is perennial; grows in hedges, woods, and marshes; where it flowers in the month of June. The leaves of this vegetable are eaten by cows, but are not relished by sheep: its roots are very grateful to cats, and particularly to *rats*; on which account they are frequently employed by rat-catchers, for enticing those vermin. And, though the roots of this plant have a strong, disagreeable smell, and a bitterish, sub-acrid taste, yet they are successfully given in hysterical cases, either in the form of an infusion, or in powder; and have also occasionally proved beneficial in obstinate epilepsies. BERGIUS recommends them as diuretic, sudorific, and vermifuge. Dr. WITHERING remarks, that they are an excellent medicine in cases of habitual *costiveness*, having afforded relief,

where stronger purgatives were ineffectual. The dose varies from 1 to 2 drams, in the form of an infusion; or from 1 scruple to a dram of the powder to adults.

VALETUDINARIANS. See CHRONICAL DISEASES; DEBILITY; HEALTH, &c.

[VALISNERIA, a singular aquatic plant, common on the Rhone, and in the river Delaware. In the U. States it is called channel weed. The following account of this plant is taken from an interesting work, entitled, "*Tour through several Parts of Europe*," 2 vols. London, 1760.

"This plant consists of a small root, with a few long leaves rising from it, and in the midst of them a stalk of two to three feet in length, but so weak, that it is by no means able to support itself erect. On the top of each stalk, is one single flower, in some degree resembling a single flower from a bunch of jessamine. It appears to be the purpose of nature, and it is absolutely necessary to the well-being of the plant, that every part of it should be immersed in water, except just the flower at the top of each stalk. But these flowers must be always kept above the water; and the heat of the sun is requisite to the opening the seeds contained in the cup at the base of them. Now the Rhone, wherein this plant grows in great abundance, is a river of very uncertain depth, and that in places very near one another: if the seeds of this plant, or the side shoots from the root, produce new ones at different depths, how is the flower to be carried to the top, and only just to the top of the water in each? The Rhone is also of all rivers the most apt to be swelled by sudden floods; in this case, how is the plant that was just flowering in its proper manner, at four feet depth, to be kept in the necessary state of having that flower above water when the depth is increased to six? Or how is it to be kept from falling on the surface of the water, and rotting, when the depth decreases, and leaves a foot or two of a naked stalk, which is unable to support itself? All this is provided for by nature, or rather by God the Creator, who with apparent wisdom and intention has made the stalk which supports the flower of this plant of such a form and texture, that it at all times suits itself to the depth of the water it is in; for the stalks are not straight,, but twisted in a spiral form, in the manner of a cork-screw, or rather in the manner of those springs of wire, which we see made by wrapping the wire round a small stick. By this formation, the stalks of this plant have a power of extending and contracting themselves in length, and this so suddenly, that let the rise or fall of the water be ever so quick, the lengthening or shortening of the stalks accompany it; and the same formation suits them in a yet easier manner to different depths. By this formation (the like of which is not seen in any other plant in nature) the flower of the Vallisneria (for so this singular vegetable is called) is kept just at the surface of the water, be the depth what it will, or the changes in depth ever so sudden. By this means, the sun has power to ripen the flower till the seeds are scattered on the surface of the water in perfect ripeness, where they float a little while; but when thoroughly wetted sink, and

take root at the bottom. To prove to occular demonstration what is said of this plant, several of them have been put into vessels of water, some of them with stalks so long, that one half of them was above the surface of the water; others with them so short, that they were immersed several inches under it; but in a few hours they had each adapted the length of their stalks to the depth, and the flower of every one was floating just on the surface."]

VANILLA, or *Epidendron nectarium*, v. *Vanilla*, L. is an exotic parasitical plant, growing in Mexico, whence its long slender pods, containing numerous black grains, are imported into Spain, and thence into England. These seeds are warm and aromatic; possessing an oily taste, and a fragrant odour, similar to that of the Peruvian balsam: they are used chiefly for imparting an agreeable flavour to chocolate, in the proportion of one grain to an ounce: the drug itself is said to be resolvent and corroborant; to afford relief in flatulency; and to promote the digestion of the oily matter contained in the cacao. On the other hand, if it be too freely used, its *narcotic* effects, though exhilarating at first, like opium, are succeeded by uncommon debility, and relaxation of the nerves. When the fresh pods are opened, they exhale such powerful fragrance, as to intoxicate the person thus employed.

VAPOUR, a term denoting those particles of bodies, that are rarefied by heat: being thus rendered specifically lighter than the atmosphere, they ascend to a considerable height, and are at length totally dissipated.

The aqueous vapours, exhaled from the earth by the solar rays, compose the clouds; from which those humidities are precipitated, in the form of RAIN. But, there are others arising from metals, extremely pernicious to animal life: such, for instance, are those disengaged by the smelting or refining of lead, which communicate a deleterious property to the grass in their vicinity; so that the cattle feeding on it frequently perish; and, if any stagnant water be impregnated with these fumes, it proves equally fatal to fish.

There are likewise mephitic vapours, discharged from the bowels of the earth; and which are peculiarly injurious both to man and cattle: of this nature, are the fumes exhaled from the Grotto del Cani, in Italy; and those generated in some wells, and subterraneous places, in Britain. As there are instances in which these were attended with melancholy effects, various expedients have been devised, with a view to render them innocuous; but the cheapest and most simple, is that proposed by Mr. EBENEZER ROBINSON, in the *Transactions of the American Philosophical Society*. He directs a pair of smith's bellows to be fixed in a wooden frame, so as to work in the same manner as at the forge: this apparatus being placed at the edge of the well, one end of a leather tube must be fastened to the nozzle of the bellows; while the opposite extremity is thrown into the well; and, on blowing them for about half an hour, all pernicious vapours will be effectually expelled. [See WELL.] If, however, any person should unfortunately have been suffocated by these exhalations, Dr. VAN MARUM, as well as M. VAN TROOS-

TWYK, in such cases, advise the lungs to be inflated with dephlogisticated or vital air, through a bladder and tube contrived for this purpose. The treatment pointed out under the article SUFFOCATION, may also be usefully employed on such melancholy occasions.

A patent was granted, in May, 1794, to Mr. ROBERT STREET, for an invention designed to produce an inflammable vapour-force, by which engines, pumps, and machinery, may be set in motion. His method consists in placing an iron cylinder with a *counter-sunk* touch-hole, in the lower surface, over a stove. When the bottom is sufficiently heated, a little spirit of turpentine, or of tar (in the proportion of 10 drops to a cubic foot), is poured into a funnel; which falls on the hot part of the cylinder, and produces an inflammable vapour. The external, condensed air, is then admitted to the touch-hole, where such fumes become ignited; and, by their concentrated force, a piston is raised, that communicates with, and works the pump or machinery, at the opposite end. A farther account of Mr. STREET's contrivance, is also given in the 1st vol. *Repertory of Arts*, where it is illustrated by an engraving..... For an ingenious and economical method of heating rooms by the evaporation of water in the form of steam, we refer the reader to the article WARMTH.

VARNISH, a clear liquid composition, which by age, and exposure to the air, becomes hard, without losing its transparency: it is employed by painters, carvers, gilders, and other artisans, for imparting lustre to their works, while it defends or preserves them from the effects of dust, moisture, and air.

Varnishes are of various colours, derived from the ingredients of which they consist: their bases are resins, dissolved in fixed oil, in volatile oil, or in alkohol; and, accordingly as either of these fluids are used, the varnishes are distinguished by the names of fat or oily, essential, and spirit-varnish.

Amber-varnish. See AMBER, vol. i.

The fine *black varnish*, obtained from China and Japan, is a resinous juice exuding from a tree called *tsi-chu*, and which is conjectured to be the Cashew-nut tree, or *Anacardium occidentale*; [see also RHUS,] but, being frequently adulterated, it may easily be imitated, by dissolving 4 oz. of gum-lac, a small piece of camphor, and a sufficient quantity of lamp or ivory-black, in 24 oz. of spirit of wine, over a gentle heat, for 24 hours; the vessel being occasionally shaken. The whole must then be strained, the pure liquid poured into a bottle, and suffered to stand for one or two days, till a clear fluid appear on the surface, which is then fit for use.

A correspondent in the 17th vol. of the *Trans. of the Soc. for the Encouragement of Arts, &c.* informs us, that copal may be dissolved in spirit of turpentine by the following process: Having prepared a glass vessel, of sufficient capacity to contain at least four times the quantity intended to be dissolved, and which should be high in proportion to its breadth, reduce two ounces of copal to small pieces, and put them into the vessel. Mix a pint of spirit of turpentine with one-eighth of spirit of sal ammoniac; shake them well together;

pour them on the powder, cork the glass, and tie it over with a string or wire, making a small hole through the cork. Set the glass in a sand heat, so regulated as to make the contents boil as quickly as possible, but so gently that the bubbles may be counted as they ascend from the bottom. The same heat must be kept up exactly till the solution is complete. It requires the most accurate attention to succeed in this operation; for, if the heat abate, or the spirits boil quicker than is directed, the solution will be impeded, and it will afterwards be in vain to proceed with the same materials; but, if properly managed, the spirit of sal ammoniac will be seen gradually to descend from the mixture, and attack the copal, which swells and dissolves, except a very small quantity. It is of much consequence that the vessel should not be opened till some time after the liquid has become perfectly cold; as it frequently happens that the whole of the contents are blown with violence against the ceiling. The spirit of turpentine should be of the best quality.

The method of dissolving copal in alkohol, is as follows: To half an ounce of camphor, add a pint of alkohol; put it in a spherical glass, with four ounces of copal in small pieces; set it in a sand heat, so regulated that the bubbles may be counted as they rise from the bottom, and continue the same heat, till the solution is completed.

Camphor acts more powerfully upon copal than any other substance. If the latter be finely powdered, and a small quantity of dry camphor rubbed with it in the mortar, the whole becomes in a few minutes a tough coherent mass. The process here described, will dissolve more copal than the menstruum will retain, when cold..... Hence, the most economical method will be, to let the vessel which contains the solution, stand for a few days; and, when it is perfectly settled, to pour off the clear varnish, and leave the residuum for a future process.

Copal will dissolve in spirit of turpentine, by the addition of camphor, with equal facility, though not in the same quantity, as in alcohol. The vehicle employed in dissolving this resin dries very quickly, and is therefore, in some cases, really attended with disadvantage; but this objection may be removed by the following process: Take a pint of nut, or poppy oil, put it into a large earthen vessel; let it boil slowly over a moderate fire; add by degrees, two ounces of white lead, and stir it continually, till the whole is dissolved. Prepare a pint of the copal-oil varnish, heated in a separate vessel; pour this gradually into the hot oil, and stir them together till all the spirit of turpentine is dissipated; let it stand till cold, when it will be fit for use.

It is obvious that, as this is a compound of the copal-varnish with the least exceptionable of the drying oils, it will partake of the properties of each. Although it imparts less brightness and durability to colours than the varnish, yet it may be used by painters in the same manner as any other drying oil, on account of the greater lustre and permanency which such colours derive from it, than are obtained from the common oil varnishes. Notwithstanding we have mentioned specific quantities of the ingredients, it must be obvious

that the relative proportions may be varied, accordingly as it is required to dry faster, or slower. It should also be remarked, that both the ingredients must be *hot;* because, if either of them be cold, the mixture will become turbid, and a part, nay, often the whole of the copal, be precipitated: but this inconvenience may be avoided, by mixing and boiling them together, in the manner above directed. Yet, as after some time, a spontaneous alteration takes place, which diminishes, and at length destroys, the drying quality of this mixture; it will be advisable to use it fresh, or at least not to employ it, after it has been prepared longer than a month or six weeks.

This varnish is also applied to snuff-boxes, tea-boards, and other articles. It preserves and gives lustre to paintings, and greatly restores the faded colours of old pictures, by filling up the cracks, and rendering the surfaces capable of reflecting light more uniformly.

[" *To lay on, rub down, and polish the Varnish.*

" When any painted piece of work is intended to be varnished, the colours ought to be laid on as smoothly as possible, and remain till perfectly dry and hard, lest you injure it in varnishing.

" The varnish must not exceed the consistence of oil, otherwise it will be too thick to work freely.

" Varnish a *painted pannel*, for instance, smoothly, and when thoroughly dry, varnish it again, observing to pick off any little hairs or grit that may have fallen on it. When the pannel has received half a dozen coats of varnish, let it stand till quite dry; then take the first pumice-stone, pulverize and sift it finely, and with a wet coarse rag, dipped into it, rub down the pannel till every blemish and streak of the brust disappears. When you perceive it is perfectly smooth, and regular on the surface, wash and dry the pannel well; then varnish it over again, repeating the coats of varnish till a sufficient body is formed. *Smooth* painting will not require it to be done more than ten or a dozen times. This being done, and properly hardened, rub it down, a few minutes with the powdered pumice-stone, as before. Clear and wash off the pumice-stone, as soon as the blemishes (if any) of the varnish disappear: then with fine emery, give it a course of rubbing down, till the pannel acquires a surface as smooth and polished as glass. Next, dry off the emery, and take powder of rotten-stone, nicely sifted, and rub it with your wet rag, till by rubbing the palm of the hand twice or thrice on the same place, it discovers a gloss equal to glass; after this, clear off the work, and dry it clean; and, with another rag, or piece of flannel, dipped in sweet oil, rub over the painted board a few times, and then use the hand to clear it off with fine dry powder, or flour: and a piece of fine flannel, dipped in the flour, and rubbed over the work, when cleared of the oil, will give it a lustre, as though the painting were under a sheet of the finest glass.

" This is the true way to polish all things varnished in oil-varnish. Such pieces of work as will admit of it, should be placed in a warm oven as every coat of varnish is laid on. Apartments, where large work, as equipages escritoires, and cabinets are varnished, should be gradually heated by stoves. Martin

had a method, in hot and sunny weather, of drawing out his voitures to receive its heat: but this practice is not to be commended, as the work may receive much injury from the insects and dust of the streets settling on it. A close room, warmed with stoves or the windows thrown open, with canvas before them, is certainly to be preferred as the most eligible mode of preserving and drying the work."

The following directions to keep a varnished coach clean, were given to a friend by an artist.

"Dip a sponge in clean water, and wash off all the mud immediately when the carriage comes in; then take a piece of woollen cloth, dipped in rotten-stone *finely powdered*, and passed through a fine sieve, and rub it pretty hard till the gloss comes out, then take a piece of soft flannel dipt in linseed-oil, and rub over the pannel and with another piece dipt in fine flour, rub off the oil. Care must be taken not to let the oil lie too long on the pannels."

The following original and excellent observations on Varnishes, were furnished the Editor by Thomas Cooper, esq. of Northumberland.

The liquids in which the substances proper for making varnishes are generally dissolved, are linseed, nut-oil, [sunflower-oil,] oil of turpentine and spirit of wine....... Hence the substances themselves are all of the class of rosins. Nut-oil is not often used, though being of a clearer colour than linseed-oil, it might sometimes deserve the preference. The other essential oils as rosemary, bergamotte, &c. are too dear and do not dry.

The substances commonly employed are such as form a transparent solution with the solvents above-mentioned, and are not liable to be affected by moisture of any kind: since none of the gums, or gum-resins are fit for the purpose.

The resins usually employed are:

Copal, amber, mastic, sandarac, lac, (both stick lac and seed lac) pine turpentine from Chios or Venice: common white rosin, dragon's-blood, gum-elemi, asphaltum, or Jew's-pitch and common pitch. To which may be added, elastic gum, or ca-out-chouc, though this is only used at present for balloons.

Oil of turpentine deadens the colour of paints: the varnishes of amber and copal brighten them.

Linseed-oil, is procured by grinding linseed in mills for that purpose. It is of a brownish colour. Before it can be used it must be made *drying*. The reason that oil will not dry without preparation is either that it contains a quantity of uncombined mucilaginous substance, or a quantity of uncombined acid, or both. I have not seen this any where ascertained; Mr. Watt told me it was acid.

The common method of making drying oil, is to put about half an ounce of litharge to each quart of the oil: boil it not hastily or violently, but with a moderate and equal fire for about two hours, scumming it. If it be boiled too hard it will be burnt and become brown. Let this rest till all sediment has perfectly subsided, then separate the clean oil, which will grow the clearer and the better for keeping. When it is made perfectly drying, it will have a scum formed at the top. Perhaps white lead would be better to use than litharge.

Poppy-oil is from the seeds of the common poppy.

Nut-oil, is the oil expressed in the same manner from walnut, or the ben-nut. It is made drying in the same manner as linseed-oil: and being clearer, is preferable for colourless varnishes.

To make boiled linseed-oil colourless, take three or four gallons of oil: add to it about two quarts of fine clear sand, and three or four gallons of boiling water: agitate it for half an hour, separate the oil, and repeat the process with fresh water.

Oil of turpentine is produced by the distillation of common turpentine: the residuum is rosin. It comes chiefly from Carolina.

Copal, is a resin produced from certain trees in New-Spain. The best is the clearest, and such as will glaze a hot tobacco-pipe without blistering.

Amber,* (Karabe, succinum) is a substance (but whether vegetable or animal is not quite determined), found upon the sea-shores of Polish Prussia....It has been by some thought a resin from trees; by others, a fossil: by others, the indurated excrement of the whale.

Mastic, is a resin produced from a small tree called the Lentisk, growing in the isle of Chio. The bark is cut, and the juice exudes.

Sandarac, is a resin produced in the same way from a species of juniper, growing on the coast of Africa.

Lac, gum-lac, seed-lac, is produced on certain trees of the fig kind, in the mountainous parts of the East-Indies, by the perforation of insects in the bark. It has been by some thought a kind of wax produced by the insects themselves. [See LAC.]

Turpentine, is collected in the Greek isles, by making an incision in the fir-trees: the juice is turpentine: the same might be obtained equally white, clear and liquid, by the same means, from the pines of this country, [America,] Venice, [Chian,] turpentine is brought over in large earthen jars. South-Carolina furnishes a good deal.

Common Rosin, the residuum of turpentine, after distilling it to obtain the essential oil.

Dragon's-blood, a resin of a red colour produced from certain trees in the East-Indies, and Madeira, and the Canary-Islands.

Gum-Elemi, a resin, the produce of trees growing in the East-Indies and Brazil.

Asphaltum, Jew's-pitch. This is a native bitumen found in various parts of the world, of a blackish-brown colour.

Common Pitch, is the residuum after the distillation of tar.

Elastic-Gum, a substance from the East-Indies and the Brazils, having all the properties of inspissated bird-lime, or of the juice of the Misletoe, as was first discovered by Mr. THIELEBEN.

It dissolves in petroleum and oil of turpentine. [See CAOUTCHOUC and VEGETABLES.]

General Observations on making varnishes of all kinds.

1st. As the substances that form varnishes are extremely inflammable, they ought only to be made in a brick or stone room with a floor of the same materials. They should be cautiously kept from a fire that flames; nor should a lighted candle come near them; for the *vapour, particularly of oil of turpentine and spirit of wine, will catch fire at some distance, by means of flame of any kind.* The operator should always have by him a woollen cloth or small blanket in a

tub of water to cover the vessel containing the ingredients in case of their taking fire. They can only be put out by thus excluding the air.

2d. The substances should be freed, as much as possible, from impurities of every kind, particularly sandarac, and preserved free from dust. The utmost cleanliness, in and about the vessels, is essentially necessary to good colour and transparency.

3d. The substances after being broken into pieces, freed from impurities and heterogenous substances, should be put by themselves in the melting pot. If reduced to powder or very small pieces, they stick to the sides of the pot and burn and hurt the colour.

4th. All the resins should be kept in vessels well stopt and closed from dust. So of the oils and spirit.

5th. When the varnish is made, it should be left some time for the dregs to settle: then be poured off clear, and then be filtered through silk or lawn.

6th. For goods that are not to be exposed to the heat of the sun, the spirit varnishes will answer: but as sandarac and mastic will melt in the sun, the oil varnishes of Copal and Amber are the most proper.

7th. Glazed earthen vessels are better than iron: copper is soluble in oil, and therefore is not to be used. The most scrupulous cleanliness is necessary to success.

Of Varnishes with spirit of wine.

Copal-spirit Varnish. This receipt is kept a great secret. Mr. Henry, of Manchester, in England, and the Sieur Watin, at Paris, make it. Henry's is rather coloured.

I have made it, by dissolving Copal in a warm place, in any of the following essential oils: bergamotte, lavender, orange, lemon, rosemary, of which the last is the cheapest; dilute it with twice the quantity of highly rectified spirit of wine. If the oil of rosemary is much adulterated with oil of turpentine, it will not succeed. Oil of turpentine precipitates the copal, but by 12 hours digestion (in a small retort with a lamp-heat) of oil of turpentine on copal, I succeeded in making a perfectly colourless varnish. See Hopson's translation of Weigleb's Chemistry, 4to. p. 475.

Colourless Spirit Varnish of Mastic and Sandarac.

To one quart of rectified spirit, add two ounces of mastic, in drops, and six ounces of sandarac, when well dissolved, add four ounces of pure Venice turpentine.

If it is wanted to be harder, substitute two ounces of gum-lac, half an ounce of gum-elemi, and two ounce of clear white rosin instead of the mastic and turpentine. But the colour will not be so good..... The first is proper for toilet-boxes, &c. the last for cane, chairs, furniture, &c. which are much handled.

Varnish for Violins and Musical Instruments.

Spirit of wine one quart, sandarac four ounces, gum-lacca and mastic, each two ounces, gum-elemi one ounce; when all is melted add two ounces of turpentine.

Gold-Colour Varnish.

Bruise separately four ounces of lacca, as much gamboge, as much

dragon's-blood, as much annatto, and one ounce of saffron. Put each of these into a quart of spirit of wine. Digest them in the sun or in a moderate heat for a fortnight, mix them with clear varnish of sandarac according to the tint you want. Four ounces of aloes dissolved in a quart of spirit will also be a good addition to the above ingredients, and give you more command over the tint you may require.

General Observations on Spirit Varnishes.

1st. A water-bath is the proper heat for spirit-varnishes. A sand-bath is liable to be too hot, and embers or coals, dangerous.

When the water once boils, keep it boiling till the substances are dissolved. This you will find by stirring it with a glass, or white wood spatula, or a tobacco-pipe.... By dissolving salt in the water, you may increase the heat. When your substances are not quite dissolved, never put them on the fire a second time to finish the solution.

Never fill the vessels but about three parts full.

2. Gum elemi gives consistence to the varnish, but should be used in small proportions. Brilliancy is given by the Venice and Chio turpentine.

3. The turpentine should always be melted separately, when the substances are dissolved: it should be melted in a small quantity of spirit of wine and then added. After the turpentine is added, give the water-bath 6 or 8 boils, and then take it off, and strain it through a very fine sieve or fine linen. It will be still clearer by standing and repose.

4. The general proportion of sandarac is about 10 or 12 oz. to a quart of spirit, and so of the other gums: if others are substituted, the sandarac must be proportionably diminished.....The spirits of wine should fire gun-powder.

5. If you want red or black varnishes, dragon's blood and vermillion, Jew's pitch and lamp-black will answer your purpose.

6. Seed-lac, makes harder varnish than shell-lac, about 10 oz. to the quart is enough.

OIL VARNISHES.

General observations on Oil Varnishes.

1. Copal and amber are the two principal substances for oil varnishes; as each of them possesses the property of making a hard and transparent varnish, they need not be mixed, but copal should be reserved for the lighter coloured varnishes. Amber, however, is tougher than copal and a little of it certainly improves copal varnish, if the tinge of colour is no objection.

2. It requires a stronger fire to dissolve copal and amber when mixed with oil, than alone: a strong heat hurts the colour. Melt therefore these resins by themselves broken into small pieces, employ no more heat than is necessary to melt them; when melted, add to them the *hot* linseed oil by degrees, stirring as you pour it in, then give a few boilings to incorporate the whole.

3. If you have more than one resin to add, melt the hardest first, otherwise, the most fusible will burn before the other is melted.

4. A sand-bath or bright coals that do not flame, is the proper heat for oil varnishes: but give no more heat than is barely necessary to melt them.

5. The vessels should be glazed

earthen ware with a cover; and new ones used, for copal varnish especially, every time.

6. When the oil and the resin are incorporated and well stirred together, add your hot oil of turpentine; this should be about double the quantity of the oil employed, but the oil should not be boiling hot when the turpentine is poured in, otherwise it may catch fire. Stir it.

7. Filter or strain the varnish; then let it rest at least 48 hours.... The sediment will do for a coarser or more coloured varnish of the same kind: the oil mixed with the sediment will tarnish the colour at the second melting.

Copal Varnish.

1. Melt slowly 1 lb. copal, add half a pint of boiling drying oil: when incorporated, add one pint of oil of turpentine made hot. You may add from half a pint to three pints of boiling drying oil, according to the consistence required.

[2. Melt in a perfectly clean vessel, by a very slow heat, a pound of clear copal, to this add from one to two quarts drying linseed oil; when the materials are thoroughly mixed, remove the vessel from the fire, and keep constantly stirring it till most of the heat is gone: then add one pound of oil of turpentine. Strain the varnish through a piece of close linen, and keep it for use. The older it is, the more drying does it become......*Monthly Magazine*, vol. 9.

M. CARENDEFFEZ formerly of St. Domingo, and at present resident at New York, finds that an ounce of good sulphuric æther, and an ounce of copal in gross powder, mixed together in a well stopped bottle, and placed in a moderate sand heat or water bath, form a perfect solution. Mr. C. remarks, that the solution, though not very cheap, affords a fine and brilliant varnish, and the process is so easy as to be repeated by any person though of very moderate skill.]

Amber Varnish.

Use the same proportions as in the former, and proceed in the same way, by adding about 4 oz. of fine Venice turpentine, dissolved in about 8 oz. oil of turpentine separately, and to the above varnishes the quantity may be encreased without the quality's being much injured.

[Mr. SHELSHAKE says, (NICHOLSON's *Journal*, 2 vol. 8vo. edit. p. 237) "by experiments repeated and varied every way that imagination can suggest, he is convinced, that amber is not soluble in alkohol, or any essential oil. It is soluble in expressed oils, by the process described in LEWIS's *Philosophical Commerce of the Arts*, but that solution does not dry well.... See vol i. p. 274.]

Gold colour Varnish, or Lacker.

Eight ounces amber, two ounces lacca; melt them; add 8 ounces drying oil: then add oil of turpentine coloured with gamboge anatto, saffron and dragon's blood, according to the tinge you want.

Black Japan.

Melt 8 oz. amber, melt (separately from the amber) 4 oz. of asphaltum and 4 oz. rosin: when melted, add 8 oz. boiling oil, and then 16 oz. of oil of turpentine,

then stir in from half an ounce to 1 ounce lampblack, and give it another boil or two.

Common Varnish.

One pound rosin, one ounce gum-elemi, eight ounces drying oil, sixteen ounces oil of turpentine.

Varnishes with Turpentine alone.

Oil of turpentine will dissolve any of these resins, except copal and amber, but it does not make so good varnish as when mixed with boiled oil.

Common Turpentine Varnish,

Is frequently made by dissolving one pound of turpentine, or about ten ounces of rosin in oil of turpentine alone.

Quere? Whether oil of turpentine would not mix with copal in oil of rosemary? Chio turpentine dissolves it well. See NICHOLSON'S *Journal*, p. 264, April, 1802.

Elastic Gum Varnish.

Cut the gum into small pieces, and digest it with 32 parts of pure oil of turpentine for 24 hours in a warmplace. Rosemary, lavender, and other essential oils also dissolve it. So does nitric æther. If softened by boiling in water, or still more in a solution of alum, it may be joined.

Varnishes of Gums.

Gum tragacanth and gum arabic may be dissolved in water; or the first in brandy. *Ichthyocolla* (isinglass) is best dissolved in brandy (or whiskey).

Elastic Gum, (see above).

Size....From diluted glue; from white leather cuttings.

Fish Size....Boiled eel skins.

MARTIN'S Copal Varnish.

In a large gallon earthen pot with a cover like a chocolate pot, melt four ounces chio turpentine: when fluid, pour in eight ounces of amber powdered: set it on the fire a quarter of an hour. Take off the pot, add to it one pound of pounded copal, four or more of turpentine, and one gill of warm oil of turpentine. Encrease the heat a little: when it has been on the fire half an hour, take it off, stir the ingredients, adding two ounces of the finest and whitest colophony or rosin. Set it again on the fire and encrease the heat till the whole is quite fluid. Remove the pot: let the heat subside a little; have ready 24 oz. (about $1\frac{1}{4}$ pint) of drying linseed-oil, poppy, or nut oil; pour it boiling hot by degrees into your gums and stir them well. When mixed, set it again on the fire, stirring it till it boils up: then take it off and add a quart of turpentine made hot: stir and give it one boil more: then add another pint of turpentine made hot, stir it well, give it one more boil, and it is enough. Strain it: if thicker than linseed oil, thin it with oil of turpentine. Let it stand a month before it is used. It should be made in an open yard, for the frequent practice is very unwholesome.

[Great danger will attend the addition of copal, as the same heat which would be required to dissolve the copal would volatalize the turpentine, and take fire if the vapour were directed to the flame.]

Amber Varnish.

Melt eight ounces of chio turpentine, pour in one pound of powdered amber by degrees, stirring it all the while: set it on the fire

for half an hour, then add two ounces of white rosin: stop the cover close, and increase the fire till the whole is melted. To this add one pound of hot drying oil; and then by degrees a quart of oil of turpentine. Amber can only be dissolved clear, by melting it with some less glutinous gum..... Same process for copal varnish.]

Copal varnish, of a superior quality, may be procured in the following manner: Take a certain portion of finely-pulverized copal; let it be thoroughly washed in soft or rain-water, then perfectly dried, and put in a glazed earthen vessel well covered, over a moderate coal-fire. After all the gum has been slowly melted, the vessel is to be removed from the fire, and half the quantity of *prepared* linseed-oil must be added, by gradually dropping it into the former; both being in a state nearly boiling.... In order to prepare the latter, take one pound of pure linseed-oil, and an equal quantity of filtrated water; pour them together in a new earthen or tinned vessel; place this mixture over a fire, and suspend the following *five* ingredients in a coarse linen bag, which, however, must not touch the bottom, namely: amber, green and white vitriol, litharge of gold, and red-lead; of each half an ounce. When the oil begins to foam, all feculent matter should be skimmed off the surface, and the liquor be suffered to boil very slowly, till the water be completely evaporated; an effect which may be readily ascertained, if the height of the oil in the vessel has been previously measured. After the two different ingredients have been incorporated in the manner above directed, and have become cool, they ought to be diluted with oil of turpentine. In the course of two or three days, all the coarse particles will subside; and the clear liquor should then be carefully decanted, or rather filtred, through fine linen. Thus, a white and transparent varnish may be obtained: it is of extensive use for all light grounds, and it is remarkably improved by age. If it be required of a harder consistence, it will be advisable to employ equal quantities of white amber and gum-copal, instead of the latter substance alone.

Another excellent *white varnish* may be made, by infusing 8 oz. of pulverized sandarac, and 2 oz. of Venice turpentine; and 32 oz. of highly rectified spirit of wine, in a glass vessel, the orifice of which must be covered with a bladder, and pierced with a pin that is suffered to remain there. The whole is exposed for eight days to the rays of the sun, or in warm sand, near a fire, and frequently shaken. When all the ingredients are dissolved, it should be allowed to stand at rest, till the liquor become pellucid; after which it must be decanted into another vessel, and will then be fit for any purpose required.

A *yellow varnish* may be prepared by dissolving, separately, 2 oz. of pure gum-lac, in 48 oz. of alkohol, and 1 oz. of dragon's-blood in the same quantity of spirit: the solutions must then be mixed, and 3 grains of *yellow wood* be added: the whole is then suffered to digest for 12 hour in a gentle heat; when the liquor should be filtred through blotting-paper, and preserved for use, in bottles closely stopped....

This preparation is chiefly employed for imparting a gold colour to brass, or iron; and when applied to leather that has previously been ornamented with tin-foil, it communicates a similar colour.

[VAULT. The vaults of privies only shall here be noticed.]

"The vaults of privies in cities ought to be constructed of the best materials; and the bricks, if bricks are made use of, should be sufficiently hard and well made to resist the passage of the soil as well at bottom as the sides; the walls should be covered with the best tarras work, and by that means made perfectly tight. But a composition of boiled tar and charcoal, finely pulverized, will be found for durability, superior to any other covering. [The cement mentioned in vol. ii. p. 68, will answer for this purpose.] The vaults, if there is room to extend them sideways, need not sink more than six feet below the surface of the ground. It is of importance to arch them completely over, except where the seats are placed, in order to confine the effluvia from the building. There should be two air funnels in opposite places to admit and let out the air. When vaults are emptied, the soil should be mixed up, and afterwards covered, with coal-ashes or lime, which will almost entirely prevent the effluvia. This should be done by persons who understand the business, who have covered carts, and other necessary conveniencies provided, and are licensed for the purpose. The soil should be conveyed out of the city to a distant and retired spot. The detestable and injurious practice of throwing night-soil into docks, and the use of tubs, should be abolished.

"It is a very false prejudice to suppose that the springs will be injured by sinking vaults. Every good bricklayer knows, or ought to know, how to make them secure; and, *if any difficulty should in this respect arise*, the master workmen in this branch of trade should be put under license, and be sworn to execute such works as may be thought worthy of legal regulation. It is not uncommon for the laws to dictate to a man how he should build his house.... Great evils require extraordinary remedies, and it must be recollected that we are devising means to rid the community of a distemper little less infectious than the plague. A vault, well built, will not become peculiarly offensive, even though, as in London, it is not emptied more than once in eight or ten years." [See SABATIER on promoting the health of New-York, in the *New-York Medical Repository*, vol. 6.]

VEAL, or the flesh of calves, is highly esteemed, on account of its tender fibres; but these animals ought to be fed chiefly with *milk*, or *hay-tea*, and to be at least six weeks old, before they are used as food. Nor should the calf be confined in a dark place, or bled frequently, during the short period of its existence, with the luxurious view of rendering the flesh whiter and more palatable.

[Mr. BORDLEY found it best to sell his live calves by weight; tho' contrary to the wishes of the butchers, because of the certainty of reducing the usual profits, gained from their superior skill in estimating the weight of the animal.

A calf alive weighed 146 lbs.

the four quarters 70 lbs. which is within 3 lbs. of half the live weight. At third live weight, this veal would cost the butcher 36*s*. 6*d*.: but, for such they gave from 32*s*. to 33*s*. on the foot. They usually sold at 7½*d*. and 8*d*. gaining above 40 per cent. profit.]

VEGETABLE KINGDOM, a term including all plants and roots which grow above and under ground; being nourished by the air, water, &c......See FOOD OF PLANTS.

The different classifications of plants by RAY, TOURNEFORT, LINNÆUS, and other eminent botanists, having already been mentioned, vol. i. p. 344; we shall at present confine our attention to the constituent parts of vegetables, and conclude with a few directions for collecting and preserving simples, both for medicinal and economical purposes.

According to the most accurate chemical analysis, plants have been found to contain:

1. SUGAR: [Sugar is decomposed by heat, and the following compounds are formed from it. Water, pyromucous acid, oil, charcoal, carbonic acid, carbonated hydrogen gas. The quantity of oil is inconsiderable, the pyromucous acid is by far the greatest, for it makes its appearance always whenever syrup is raised to the boiling temperature. Hence the reason, that when we attempt to crystallize syrup by heat, there always remains behind a quantity of incrystallizable matter known by the name of molasses; whereas, if the syrup be crystallyzed without artificial heat, every particle of sugar may be obtained from it in a crystalline form. Hence, we see the importance of properly regulating the fire during the crystallization of sugar, and the immense saving that would result from conducting the operation at a low heat....See also article SUGAR.]

2. STARCH; which see.

3. *Gluten* is a viscid matter, that remains after washing wheaten flour, in the preparation of starch, and which also subside when paste is repeatedly washed with cold water, till that fluid become perfectly transparent. It is very tenacious; and, if combined with the nitric, it may be converted into the oxalic acid, which is known under the name of *Essential Salt of Lemons*.

4. ALBUMEN: [If the water in which flour of wheat has been washed in order to obtain starch and gluten, be filtrated, and afterwards boiled, a substance precipitates in white flakes, to which Mr. FOURCROY, who first pointed it out, has given the name of *Albumen*, on account of its resemblance to the white of an egg. Mr. FOURCROY found albumen in the expressed juice of scurvy-grass, cresses, cabbage, and almost all cruciform plants, but never a particle in those parts of vegetables which contain an acid.]

5. JELLY; 6. GUM; 7. CAMPHOR; and, 8. RESIN; to which we refer.

9. CAOUTCHOUC, or Elastic Resin, is obtained not only from the tree mentioned in that article, but exists in numerous plants, particularly the *misletoe*, from which it may be extracted by infusion in water.

[Dr. PHYSICK of Philadelphia observes, "It has long since been known, that elastic gum may be rendered very soft by spirit of turpentine, and that it can be dissolv-

ed in it by the assistance of heat, but it has been observed, on evaporating the turpentine, that the gum looses, in a great degree, its elasticity, and on handling, it sticks to the fingers.

"After a number of experiments, I found, that by immersing it in weak vit. æther for 12 hours after the action of the sp. turp. its original properties were regained. By exposure to the air, the æther evaporates, and leaves the gum in its original state. I have observed, however, that when the gum elastic is dissolved with the assistance of heat in spirit of turpentine, it cannot be restored to its former state so perfectly, as when it is made into a paste without heat. When gum-elastic is immersed in spirit of turpentine, it is unequally affected by it; at the end of two days some portions will be found very soft, and others remain more firm, so that it cannot be spread evenly over a surface: by rubbing it, however, on a marble slab, most of these solid portions may be broken down; and by straining it through fine linen, a paste of gum elastic may be obtained of equal consistence. This paste may be used for the construction of catheters, &c. either by itself, or it may be applied over cat-gut or silk, wove by the whip makers into cylindrical tubes. If the paste be made with spirit of turpentine, prepared as below mentioned, it will become dry by exposure to the air for a few hours, when another layer may be applied, and this may be repeated until the instrument is sufficiently covered with elastic gum, after which it may be immersed in æther, and then dried. Dr. P. found that spirit of turpentine distilled from quicklime, acted rapidly on the gum elastic, and dried completely in about six hours: the gum was left free from stickiness, and possessed its former elasticity, and he thinks that spirit of turpentine distilled two or three times, would be depurated sufficiently to have the elastic gum in a more perfect state, and enable us to apply it to different uses, without being under the necessity of using æther." See *N. York Medical Repository*, Hexade, 2d, vol. i. p. 36. See also *Domestic Encyclopædia*, vol. i. p. 502. Several vegetables in the United States yield caoutchouc, and an interesting *Memoir* will shortly be published on the subject, by Dr. WOODHOUSE.]

10. WAX: [See also MYRICA]; 11. ACIDS; 12. ALKALIES (see also BARILLA, KELP, POT-ASH, &c.)

[Under the above heads, may be found some observations on the utility of alkaline salts; and their beneficial effects in curing the effects of a snake's bite was noticed in vol. iv. p. 471. The following condensed observations on pot-ash may be useful.

Pot-ash....An alkaline salt, obtained generally from vegetable substances by incineration. It has been said to pre-exist in some plants; but though this should be the case in a few instances, the common mode by which it is produced, is through the agency of fire.

In the table of chemical nomenclature, pot-ash is ranked among the elementary substances. And, indeed, it must be acknowledged, that its exact constitution by analysis is not known. But there is strong reason to believe, that the septon which is the basis of azotic air, enters into combination

with one or more ingredients in the wood, and therewith forms this saline material. And it is alledged, that if carbon be burned in oxygenous air alone, that carbonic acid will be formed, but that there will be no pot-ash.

Tho' this alkali is so generally afforded during the process of combustion, yet some vegetables afford much more of it, than others. Thus pine-wood affords but a small quantity of ashes, while wormwood yields a very large proportion. It generally however happens, that combustion is a process by which pot-ash is produced; and thus alkali, salamander-like, may be called the creature or child of the fire.

Dr. MITCHELL has attended with great care to the history and economical effects of this salt. He considers this alkali as working great and admirable effects in the world by its anti-pestilential and anti-septic qualities. Wherever fuel of wood is converted by fire into ashes, an agent is produced, which has, by a wonderful provision of nature, the power to counteract putrefaction, and to check the nastiness and pestilence which so commonly spring from it.

Hence he has explained, wherefore the aborigines of America, so generally employ the fine and unmixed ashes of wood, fresh from the fire brands to season their animal food as they broil and roast it, when no sea-salt can be procured. White-men who have lived among the Indians, and eaten meat with a sprinkling of this alkaline condiment, declare, that though inferior in relish to the muriate of soda, (common salt) it is however palatable and wholesome.

In like manner, among those rude tribes where the dawnings of useful arts may be seen, Dr. MITCHELL has remarked the employment of wood-ashes for the purpose of preserving their animal food from putrefaction, and of keeping it sweet and good to eat. The like had been done by Dean HAMILTON, in his paper published in the *Transactions of the Royal Irish Academy*; in which papers, the antiseptic power of the vegetable fixed alkali is clearly shewn.

Ashes of sound and hard wood, as of hickory for example, are found to be of excellent service, in the preservation of hams and bacon. To rub gammons with clean ashes, or to dip them in a solution of pot-ash, is found to be an excellent practice. The addition of a portion of pot-ash to the brine of common salt, is commended by many domestic economists, as an excellent mode of pickling bacon and preparing it for the smoke-house. It supercedes the necessity of salt-petre; for the septic acid formed in the meat or flesh, during the incipient stage of putrefaction, is neutralized by the pot-ash when thus applied, and a quantity of septite of pot-ash or of salt-petre is formed upon the spot. This supercedes the external application of salt-petre.

From these uses of pot-ash, mankind seems to have passed to the agency of it in cleansing the human body. When put into water, wood-ashes and pot-ash impart to it an alkaline quality. This solution is called a *lixivium*, or a *ley*. Such a ley, possesses admirable effects in removing from the human skin, all kind of perspiratory matter and uncleanness. In order to be used for the purpose of detersing the

living skin, pot-ash ought to have been exposed to the air to attract carbonic acid, and the ley should be of moderate strength. Then it cleanses away all filth, and by doing so, neutralizes or destroys the subtle venom which lurks in the perspiratory discharges, after they have been for some time exposed to the atmosphere. Alkaline ley is thus a remarkable promoter of cleanliness and health, and a preventive of typhus and other fevers.

Dr. MITCHILL reasons in the same manner as to the clothing worn by human beings; and interprets the operation of pot-ash to make them clean and healthy in the like way. The same filthiness as to beds and bedding, and the same method of correcting and removing have been equally well made out. The floors, furniture, and apartments of inhabited houses require to be rendered pure and healthy, by pot-ash, and other alkaline salts. The febrile and other diseases consequent upon the accumulation of human nastiness in the unventilated, unwashed, and unalkalized dwellings of the poor, have induced Dr. MITCHILL to recommend to the friends of that suffering portion of men in England, to carry with them into the habitations of the indigent, alkaline salts and earths, the great neutralizers and destroyers of pestilence.]

13. OIL; which has already been explained.

14. *Earths*....for instance, *lime*, which abounds in almost every plant; *silica*, or pure flint, has been discovered in the different species of HORSETAIL and GRASS; *magnesia*, which occurs chiefly in the marine plants, particularly the SEA-WRACK, and the exotic species of the Saltwort, or *Salsola soda*, and lastly, *alumina*, or pure clay, which is found only in a few vegetables.

15. Several *metallic substances* have likewise been chemically separated; though in very small portions. Thus M. SAGE has clearly proved that gold exists in many plants; M. M. SCHEELE and PROUSE have obtained manganese from the ashes of the Vine, Green Oak, Fig-tree, Pine, &c. Iron also forms an ingredient in almost every plant, but particularly in the different species of the SALTWORT.

16. The *Woody Fibre* is the basis of all vegetables: it abounds mostly in trees, but occurs less frequently in herbs; is insoluble either in water or alkohol, but is acted upon by alkalies; and is also decomposed by the mineral acids: when burnt in a smothering heat, it yields a large proportion of Carbon, or CHARCOAL.

[17. TAN, or Tannen....is the tanning principle of plants. It was first discovered by Mr. SEGUIN, who pointed out some of its properties, and the method of detecting it in plants. Tan exists in the solution of nut-galls combined with gallic acid. The oxyde of tin has a strong affinity for it. Tan exists in almost all vegetable substances which have an astringent taste, and is almost constantly combined with gallic acid. The following table drawn up by Mr. BIGGIN (*Philo. Transactions*, 1799) will give some idea of the proportions of tan which exist in different plants.

	Pro. of Tan.	
Elm, ...	2	1
Oak cut in winter, ...	2	1
Horse Chesnut, ...	2	2
Beech, ...	2	4

	Pro. of Tan.	
Willow (boughs)	2	4
Elder, ...	3	0
Plum-tree, ...	4	0
Willow (trunk)	4	0
Sycamore, ...	4	1
Birch, ...	4	1
Cherry-tree, ...	4	2
Sallow, ...	4	6
Mountain Ash, ...	4	7
Poplar, ...	6	0
Hazel, ...	6	3
Ash, ...	6	6
Spanish Chesnut, ...	9	0
Smooth Oak, ...	9	2
Oak cut in spring, ...	9	2
Huntingdon, or Leicester Willow, ...	10	1
Sumach, ...	16	2

See article TANNING.]

The mode of collecting vegetables, or simples, varies according to their peculiar nature, and the different parts to be preserved. Thus, annual roots should be dug up before they shoot forth either stalks or flowers; biennials in the autumn of the year in which they were sown; and perennials also in the autumn; though some naturalists prefer the spring for the collection of the latter; because at that season they abound with juice, or sap: but, as they are then apt to shrivel in drying, the autumn is doubtless the most proper time for such purpose.

Herbs ought to be gathered, when the leaves have attained their full growth, though previously to the appearance of the flower-buds. With respect to the removal of leaves, no certain rule can be given; but flowers should be plucked on a clear day, when they are moderately expanded: after having been carefully selected, both herbs and flowers must be cautiously dried in a gentle heat, so that their strength and properties may be more completely preserved: and, if they contain any subtle or volatile matter, it will be advisable to pulverize them as speedily as possible, and to keep such powder in close glass vessels.

All fruits, however, should be allowed to become perfectly ripe, before they are removed from their stems or branches, excepting sloes, and one or two other astringents, that lose their virtues, if suffered to remain on the trees till they attain to maturity. Nor should seeds be collected, until they begin to grow dry, and are about to drop or shed spontaneously; when they ought to be preserved in an open situation, without being separated from their husks: as these serve to protect them from injuries of the air and weather.

Under the article PRESERVATION, we have alluded to a new and excellent method of keeping vegetables of every description in a *sapid state, for many years*, excepting cucumbers and radishes.....it simply consists in drying them on a plastered floor, or an oven, moderately heated by a fire made below the structure; so as to avoid singeing or burning the leaves, stalks, &c. the whole process being conducted in the manner about to be described, and requiring no farther care in regulating the degrees of heat, than is necessary in the baking of thin biscuits; provided the former be exposed on their surface to the open air, for dissipating the moisture, while the latter are confined in an oven.

In order to succeed completely in this useful pursuit, the herbs and roots, as well as every species of fruit to be preserved, ought first to be cleaned, either by wiping, wash-

ing, and otherwise cleansing it in a manner similar to that practised for culinary purposes. The water should be completely drained, by placing the different articles on sieves, or frames on which canvas is expanded, or perforated boards, or similar contrivances. After repeatedly turning the leaves, stalks, or fruits, so that each side may become dry, they must be spread over a floor or oven, constructed on the principle before mentioned, till all their moisture be thoroughly evaporated; for, if the least humidity remain within the substance of such vegetables, they will become mouldy and corrupted...... The best criterion for ascertaining the due degree of exciscation, is that of the stalk breaking readily, and the leaves being easily reduced to powder between the fingers. In this shrivelled state, however, they could neither be packed nor conveniently transported: hence, it will be proper to remove them previously to a cellar, or other damp place, till they have become so pliable by the absorption of moisture, as to be compressed without crumbling to pieces. This degree of humidity is, according to experience, not detrimental to the preservation of the plants, and in its effects very different from that retained in their interior parts. Next, the vegetables thus prepared, ought to be packed either in a strong paper formed in the manner adopted with tobacco-leaves, or in wooden boxes which have been completely dried; as otherwise they will acquire the flavour peculiar to the wood. If the directions here given be strictly followed, vegetables may not only be presevced for a long time, without losing any of their essential properties, but they may also be reduced to the 16th, 20th, nay, to the 24th part of their natural bulk. Mr. EISEN, the inventor of this process, observes in his paper quoted in a former article, that half an ounce of such concentrated herbs or roots will be a sufficient allowance for each person, if eaten together with animal food; and that a traveller may carry provisions for two months in his pockets, especially as mushrooms, lobsters, small fish, and other animal substances, may be preserved with equal success....Lastly, when such provisions are to be dressed, it will be necessary either to infuse them for a short time in hot water, before they are exposed to the fire; or, to steep them, particularly leguminous fruits, in cold water, so that they may swell to nearly their natural size; after which they may be treated in every respect like other culinary objects.

[Under the article SEEDS, some directions were given on the *selection*, *preservation*, and *sowing* of seeds.....The following additional remarks, on seeds generally, are added from Dr. DARWIN's admirable work, entitled, "*Phytologia*."

"Many of the circumstances before related concerning the production and enlargement of fruit, are applicable to the production of the seeds, which are included in them; but those seeds, which contribute most to the nourishment of mankind, many of which are the progeny of annual or biennial plants, require other modes of cultivation.

"I. 1. *To produce seeds early in the season.*

"Those plants, which are required to yield a forward crop, as

the peas and beans of our gardens, and those which our cold and short summers will not otherwise perfectly ripen, as wheat, should be sown before the commencement of winter, either in natural ground, as in the cultivation of wheat, or in situations sheltered from the north-east, as in the garden cultivation of peas and beans; or they may be sown very thick in hot-houses, or under hot-bed frames, or under warm walls, and be transplanted, when they are one or two inches high, into the natural ground, at due distances, when the weather is milder, and the plants are become hardier or less liable to be destroyed from their having longer acquired the habits of life.

"When young plants of any kind are transplanted, the ground should be recently dug; as their expeditious growth depends so much on the atmospheric air being buried in the pores or interstices of the earth, by the production of carbonic and nitrous acids, and ammonia, and heat.

"The same advantage occurs by soaking seeds in water, or in the drainage from manure heaps, till they are ready to sprout, and then sowing them in a soil lately turned over; as their roots will then immediately put out, by the newly generated heat, and newly produced carbonic acid in its fluid, not its gasseous, state.

"2. The transplanting of young roots, if they be set no deeper than before, does not, I suppose, multiply the number of stems; as occurs when wheat is transplanted so deep as to cover the second joint: but by tearing off several small extremities of the roots, the new production of many viviparous buds is prevented, and that of oviparous buds increased in consequence.

"When the roots of wheat are transplanted and divided, not only a great increase of the crop is produced, but I believe the seed is likewise ripened earlier. And it is well known to gardeners, that transplanting garden-beans forwards them in respect to time, but shortens the height of the stem. Hence transplanted vegetables grow less in height, as transplanted beans, and less branchy, as transplanted melons, but produce and ripen their seeds earlier; which is a great advantage in the short summers of this climate; and if the roots can be divided, as in wheat, or new scions can be produced by their being transplanted deeper, as also occurs in wheat, the quantity of the seed may also be wonderfully increased by transplanting.

"3. Another mode of forwarding the production of seeds, and of sooner ripening them, consists in pruning off the viviparous tops or lateral shoots, which will bear no seeds at all, or only small or imperfect ones, in our northern summers. For this purpose the cutting away the tops of beans and of peas, and the lateral branches of artichokes, after the fruit buds are formed, both forwards and enlarges the flowers and seeds, which remain, as more nourishment is derived to them.

"4. As a superfluous supply of water is more friendly to the production of leaf-buds than to the generation of flower-buds, to derive less water than usual to the roots, forwards the production of seeds, a fact well known in the gardens of warmer climates, which are perpetually watered from reservoirs

or wheel-engines. But when the blossoms appear, an addition of water must forward their growth by supplying nourishment, which should again be lessened when the fruit has acquired its full size, both to expedite its ripening, and to increase its flavour; as the saccharine matter and essential oil will be less diluted with water.

"In the dry summer of 1799, I had the opportunity of flooding some rows of beans in my garden, which by being done too frequently, or too copiously, occasioned them to grow to a much greater height than usual, and in consequence to bring to perfection few seeds, and some of them none. As I suppose the new shoots of fig-trees in the beginning of summer occasions the first production of young figs to fall off, from the want of that nourishment, which is now expended in the growth of new leaf-buds. Whence the facility of producing leaf-buds seems evidently to prevent the generation of flower-buds; and the use of cutting off the summits of tall beans is thus explained, as directed above.

"II. 1. *To produce seeds in great quantity* from annual or biennial plants they should be brought forward in respect to the season in our northern summers; that a greater quantity of viviparous buds may arrive early at their maturity for the purpose of generating oviparous buds soon enough in the summer to ripen their seeds; on this account those should be sown in the autumn which will bear the severity of the winter.

"Nevertheless the seeds of those plants, which are natives of this climate, should probably be sown at the time they become perfectly ripe, as occurs to them in their natural state; that is, either when the seed is shed upon the ground by the parent plant, or when the fruit or husk, which encloses it, becomes naturally ripe after it has fallen on the ground. Thus I have seen crabs covered with leaves in hedge-bottoms, which have not decayed till the early spring. Many pears do not become ripe in our store-rooms till March or April; and ivy-berries and holly-berries hang on their respective trees till the vernal months, and are not, till that time, eaten by the thrushes. Hence it is probable, that the seeds in these durable fruits or berries continue to ripen, or to become more mature, and prepared for their future growth during the winter months.

"2. It was heretofore shewn, that when wheat was transplanted so deep as to immerse the first joint above the root into the soil, many new stems would shoot up and strike their roots into the earth; and that thus four or six new plants, or more, would be generated by the caudex of the leaf-bud, which constitutes that joint. This mode of transplantation therefore will much increase the quantity of the crop of seed, if it can be done soon enough for these additional stems to ripen the corn, before the summer ends.

"There is another mode of increasing this product of additional stems without transplantation, which consists in sowing the wheat in rows by what is called a drill-plough according to Mr. Tull's method; and when the first stems rise a few inches high, a horse-hoe, made like a very small plough, is to be brought so near each row, as to turn

up some earth against the stems, so as to cover the first joint above the root with soil; whence new stems will be generated, and shoot up round the old one; and thus increase the crop in the same manner as by deep transplantation.

"The theory of Mr. TULL's drill husbandry, which is of late years supposed to have been improved by introducing the hand-hoe in place of the horse-hoe, and thus giving an opportunity of sowing the rows or drills nearer together, as will be seen by the following method, now introduced into almost general use in Norfolk by Mr. COKE; though Mr. TULL himself much prefers the horse-hoe as turning over the earth much deeper than the hand-hoe, and thus rendering that part of it more exposed to the air, which was before more deeply secluded from it; and also rendering it more pervious to vegetable roots; to which may be added, that both kinds of hoeing render the surface more permeable to the rains and dews, and prevent the cracks in dry weather, which are very injurious to the roots of plants; both which advantages depend on the porosity of the soil, which must extend deeper by the use of the horse-hoe than the hand-hoe.

"Mr. TULL makes other ingenious remarks on the use of horse-hoeing. In the beginning of winter, when the wheat has obtained one blade like grass, or two or three leaves, the horse-hoe is brought near the rows and deep, and the earth turned from them so as to form a ridge between them. By this ridge, in level grounds, he thinks the rows are shaded from the cold winds in some situations, and that the roots of the wheat are kept drier, and thence less injured by frosts. In the spring this ridge in the intervals between the rows is divided by the horse-hoe, and turned back against the rows of corn after it has been fertilized by the air and rains, and dews of winter.

"Mr. COKE of Holkham in Norfolk, assured me, that in thirteen years' experience on a farm of 3000 acres, he had found the drill husbandry in that country greatly superior to sowing seeds of all sorts by the hand in what is termed the broad-cast method, but differs in the number and arrangement of his rows from the method of Mr. TULL, in the following circumstances.

"Mr. TULL drilled two rows of seed a few inches from each other, and then left a space of two or three feet, and then drilled two more rows near each other, for the purpose of passing a hoe between each double row drawn by a horse, which was therefore termed a horse-hoe; but Mr. COKE drills all his rows of wheat and of peas 9 inches from each other, and those of barley six inches and three quarters from each other; this is performed by a drill-plough made by the Rev. Mr. COOK, which drills six rows at a time, and thus sows an acre of land in an hour, and is drawn by a single horse; and the quantity of seed consumed is about six or seven pecks to an acre, which is about half what is used in sowing by the hand in the broad-cast method.

"Early in March Mr. COKE uses the hand-hoe, which for hoeing the rows of wheat and of peas is 6 inches wide, and for hoeing those of barley, 4 inches wide. By this hoe the surface is not only turned

over, and the weeds between the rows rooted up, but it is also accumulated about the roots of the growing corn, and covers and consequently destroys the low growth of poppies amongst them; which are a very frequent weed in that part of the country. A second hoeing is performed about the middle of May, and the soil is again, not only cleared from weeds, but accumulated against the rising corn, each of which hoeings cost about 20 pence an acre.

"Nevertheless I am informed, that some attentive agricultors use the horse-hoe belonging to Mr. COOK's drill-machine, though the rows of corn are but nine inches from each other; and assert, that this occasional trampling of the horse on the young plants is of no very ill consequence, a circumstance well worth observing, as it removes the principal disadvantage of the horse-hoe, which consists in the too great distance of the alternate rows of the corn plants.

"By the earth being thus accumulated against the roots of the corn it is said to tiller or tellure much; that is, to throw out four or six stems, or more, around the original stem, and thus to increase the number of ears like transplanting the roots, insomuch that Mr. COKE obtains by this method between four and five quarters of wheat on every acre, which, in the broad-cast method of sowing, did not yield more than three quarters on an acre; beside saving a bushel and half of the seed corn, unnecessarily consumed in the broad-cast method of sowing. To this should be added another advantage, that as the land is thus kept clear from weeds, and has its surface twice turned over, and thus exposed to the air, it is found to save one ploughing for the purpose of a succeeding crop of turnips.

"It is probable, that one hand-hoeing in the beginning of winter, so managed as to turn the soil from the roots of the corn, and to leave it rather elevated between the rows, as Mr. TULL recommends to be performed by his horse-hoe, might give a similar advantage to this mode of cultivation; and also if another hand-hoeing was applied, as soon as the wheat is out of blossom, to supply more nourishment to the young seed might increase its plumpness and weight.

"The lands thus managed by Mr. COKE are laid level, and not in ridges and furrows, and can thus be ploughed crosswise; and the crop is equally good throughout the whole; whereas in the furrows of some lands it is less forward or less prolific than on the ridges; whence much light corn is mixed with the good, which is obliged to be separated from that, which is marketable, and used for hogs or poultry. Add to this, that in this mode of husbandry the straw is believed to be larger and in greater quantity as well as the grain, and the land to be less impoverished; as no weeds are suffered to grow on it, and as its surface is so frequently turned over, and exposed to the air.

"In China the corn lands are laid on a level, not in ridges and furrows; which is supposed to be the most advantageous plan in almost every situation, which is proper for the cultivation of corn; as by being thus rendered capable of being divided by cross-ploughing, almost any kind of soil may be rendered more proper for the use of the drill-husbandry, by which it is

seen in the above account of Norfolk management, that 12 bushels more of wheat are raised on an acre, and one bushel and a half saved in the consumption of seed-wheat, which at six shillings a bushel arises to a considerable sum on a large farm.

"Nevertheless there seem to be many advantages attending the forming the surface of land into ridges and furrows; in wet lands with a substratum of clay the furrows are convenient channels to carry off the water, where there is a sufficient declivity, as treated of by Mr. Tull in his horse-hoeing husbandry, ch. xvi. Add to this, that in some situations a deeper stratum of the soil, where it is valuable, may be occasionally turned up, and exposed to the air, and to the roots of vegetables, by gradually changing the locality of the ridges; and lastly, in every situation a greater surface both of the soil, and of the summits of the stems, or ears, are exposed to the influence of the air by means of ridges and furrows; for as the plants of wheat are but three or four feet high, the surface of a crop of wheat is increased as well as the surface of the ground it grows upon, and not as the base on which the declivities or hills rest, as some have erroneously supposed.

"There is another method of sowing wheat in rows used in some countries, which is termed dibbling in the language of agricultors, and consists in making perpendicular holes one inch and half or two inches deep, as is commonly done in planting potatoe-roots; these holes are made by a man, who has a proper staff shod with iron in each hand, and as he walks backwards is able by looking at the part of the row already made to keep nearly in a straight line, and to make two holes at once at about nine inches distance from each other every way. Two or more children attend the man, and drop two, or three, or four seeds into each perpendicular hole, which are afterwards covered by drawing over them what is called a bush-harrow.

"This method of sowing the wheat in rows adapts it for the use of the hand-hoe, as well as for the drill machine; but must be attended with greater expence, and I suspect with less accuracy of the distribution of the seed, owing to the hurry or fatigue of the children employed; and I also suspect that sowing in drills is preferable; because a greater quantity of earth is *turned over*, and *much air* in *consequence included* in *its* interstices; whereas in making perpendicular holes the sides of the holes are compressed, and rendered more solid: whence potatoe-roots also might probably be more advantageously planted by making drills instead of perpendicular holes.

"A correspondent of the board of agriculture asserts, that on looking over a field of potatoes near Leicester, which had all been planted at the same time, and on land equally manured, he observed a great difference of the growth of one part of the field, which on enquiry he found to have been owing to the roots having been planted in drills, where the plants were so much stronger; and by a setting stick in holes, where they were so much less vigorous; *English Encyclopedia, Art. Husbandry*, page 433: which difference of growth I suppose to have been owing to the circumstances above mentioned.

"A few ears of wheat were lately given me, which were branched, having four or five less ears growing out of each side of the principal ear; it was procured at Liverpool, and was called Egyptian wheat, or Smyrna wheat. It is described in the *Supplem. Plantarum* of the younger LINNÆUS, as well as the species Plantarum of the elder; and is said to be a native of Egypt, and to be cultivated at Naples; it is called "*triticum compositum*, or wheat with a compound ear, crowded with less ears, awned: and is said to be related to *triticum æstivum*, summer wheat; but the spike is four times larger, a hand in length, composed of less spikes, two faced, alternate, approximated, from nine to twelve, the lower ones being shorter, and the top one solitary."

"The plant which was given me, had five tall and thick stems from one root, but seemed to have been plucked up before it was quite ripe, whence I cannot judge of the size of the grain, but should imagine, that it is a species well worthy of attention. The few ears which I possessed, were sown in the spring of this year, 1799, not having obtained them soon enough to sow in the autumn. When they were an inch or two high, they were transplanted into a moistish part of my garden; and though the year has been uncommonly cold and wet, and a great part of the autumn-sown wheat of this country is blown down upon the ground, and is not yet ripe, yet almost every root of the Egyptian wheat has from ten to twelve stems, and stands upright on strong straw about three and a half, or four feet high. The best stems have one principal ear, about five inches long, with five or six shorter ones branching out on each side of it. They begin to appear brown, and I hope will ripen. I have since found that this species of wheat is mentioned in TULL'S *Husbandry*, under the name of Smyrna wheat. He adds that it is highly productive, but on that account requires a good soil.

"3. Another method of promotting the growth of lateral stems consists in destroying the central shoot; when this is done, other new stems arise from the joint immediately above the root, which in wheat is in contact with the earth. On this account, when wheat plants are sufficiently forward in respect to the season, it is thought to be advantageous to eat the first stem down by sheep, to increase the quantity of the subsequent crop. It should be nevertheless observed here, that the trampling of the sheep on lands, which are not too adhesive, will press down the first or second joint into the earth, and thus assist the production of many side shoots. But in very adhesive soils this trampling of the stems into the ground may be injurious. In soils which are not too adhesive, when the crop appears thin, it is probable, that a roller drawn over it by pressing the first or second joint into the soil, might promote the production of side shoots, or make them tiller, or tellure, in the language of agricultors. And when grass or clover-seeds are designed to be sown on the wheat-land, it might first be harrowed, and then either rolled or trampled by the sheep, which eat it; either or both of which might press down the root-stems of the corn, and cover the newly-sown clover-seeds with soil.

"This mode of eating down forward wheat with sheep is analogous to cutting off the central buds of melons and cucumbers to make them produce earlier fruit, and in this climate perhaps in greater quantity; as those produced after the great extent and elongation of the central branches would be too late to ripen in this climate: and by their exuberant generation of a viviparous progeny would retard the succession of lateral shoots, and a consequent quicker production of flowers.

"Nevertheless where the crop is not too luxuriant or too forward, the eating down the first stem by sheep may be an injurious practice; as Mr. Tull thinks, that by thus destroying the first stem, the ears of the later ones have not time to ripen, and thence becoming light in respect to the size or plumpness of the grain; and that these secondary stems become weak, and are liable to fall down, both which he says commonly occur where the crops are eaten by sheep.

"Mr. Tull, whose work is throughout a great effort of human genius, adds a very wise axiom, "that it is most advantageous to hasten what we can, the time of blossoming; and to protract the time of ripening:" for it is the farinaceous reservoir of nutriment laid up in the cotyledon of the new seed for the future growth of the corculum or new embryon, for which we cultivate the plant; and this reservoir is formed between the blossoming and ripening of the grain, either before or after the impregnation of the pericarp, or seed-vessels, and thus renders the grain plump and heavy. Mr. Tull in another part of his work, recommends an additional horse-hoeing immediately after the blossom is over, to supply more nutriment to the ripening grain. Mr. Tull esteems the eating down of wheat by sheep to be generally a very injurious practice in this climate, by rendering the ears light and the straw weak; by retarding the time of blossoming, as well as the growth of the stems.

"4. In the moist springs of this climate many annual or biennial plants are liable to shoot out too many, or too strong, viviparous branches, which cannot generate flower-buds soon enough to ripen their seeds, in our cold and short summers. This always happens to cucumbers and melons, which were brought from warmer countries, and to the peas and beans of our gardens, and sometimes to corn plants, which are liable in wet seasons to produce too strong stems and foliage, which have not time to generate the flower-bud at their summit soon enough to perfect and to ripen the seed. Melons and cucumbers have heretofore been mentioned; and in respect to garden beans their viviparous tops should be pinched off, which if not too old may be eaten as an agreeable vegetable, when well boiled; and thus more nutriment is derived to the oviparous buds beneath, which renders them larger, and perhaps more numerous. To prevent field peas from running into straw in moist soils less manure should be used; and field beans may have their tops cut off by a scythe fixed into a straight shaft.

"Annual cotton plants are much cultivated in some colder parts of the Chinese empire, and the cultivators lop off the tops to increase the number of pods, and to hasten their production; and in the West

Indies the flowers of the rose-tree are believed to be accelerated and increased by topping the branches. *Embassy to China*, by Sir George Staunton, vol. iii. p. 208, 8vo. edition.

" When the stems and foliage of wheat are thus too vigorous, it may be advantageous to eat it down by sheep as above mentioned; which may not only destroy the too vigorous viviparous central stems, but also produce a greater number of lateral ones; which may sooner terminate in oviparous ones so as to produce more grain with less straw.

" 5. It is also propable, that rolling them as mentioned above, if it be done in a morning before the dew is off, might so far bruise the stems and roots, as to stop their too great propensity to nourish the viviparous buds, and in consequence to favour the growth of the oviparous buds on their summits; which might forward the harvest season, as well as increase the product of grain in proportion to the quantity of straw. From rolling wheat in spring on fields where the surface remains uneven or cloddy, another advantage may be derived, by breaking the clods or eminences, and thus earthing up many of the stems above the second joint, and thus inducing a new set of root-scions to put forth, or tiller.

" 6. The garden plants, which are too vigorous in situations where there is a command of water, as in the gardens of warm climates, should have less water derived to them, till the blossoms appear; because a greater quantity of moisture facilitates the production of viviparous buds so much as to retard that of oviparous ones, and thus diminishes the quantity as well as retards the ripening of the crop. But in these situations, as soon as the blossoms appear, a greater supply of water should be allowed, which will contribute to nourish and enlarge them, as mentioned above; as is practised in some countries of the east, where they do not flood their rice-grounds, till they are in flower. But less water is again required, when the seed has arrived at its full size, as before spoken of.

" III. 1. *To forward the ripening of seeds.* A due degree of warmth and of dryness seems to include the circumstances principally required. The warmth not only accelerates the various secretions of vegetables by increasing their irritability and consequent activity, but after the mucilaginous, starchy, saccharine, and oily matters are secreted into proper reservoirs, may contribute perhaps chemically to their change into each other, or to their greater perfection. And the dryness of the air, whether hot or cold, is necessary to give perfect ripeness to seeds; as otherwise the due exhalation of the aqueous parts of the secreted fluids, which form the nutritive parts of seeds, does not properly proceed; and the seed gathered in this condition is liable to mildew in the barn or granary, or to become shrivelled and wrinkled, as it dries.

" 2. It is believed in Scotland, that even the frosty nights of autumn contribute to ripen the late crops in that inclement climate, which some have ascribed to the moonlight, but, which I have indeed suspected, that the frost may in some measure effect, by converting the mucilage of the grain sooner into starch. This I was induced to imagine by having ob-

served that book-binder's paste, made by boiling wheat-flour in water, lost its adhesion after having been frozen; and also from a culinary observation, that when ice or snow is mingled with flour instead of water in making pancakes, that it much improves them; the truth of which I have heard boldly asserted, but never witnessed the experiment.

"There is nevertheless an experiment related by Dr. ROEBUCK in the *Edinburgh Transactions*, vol. i. which seems to shew, that the grains of oats continue to fill and to become heavier even during the autumnal frosts; which may probably occur during the sunshine of the middle part of the day, as occurs in the vernal frosts of this part of the country. In 1780, near Borrowstoness, the oats were green even in October, when the ice was three-fourths of an inch thick. He selected several stalks of oats of nearly equal fulness, cut half of them, and marked the remainder, which continued 14 days longer in the field; after being dry, the grains of each parcel were weighed; and 11 of those grains, which had remained in the field, weighed 30 of those which had been cut a fortnight sooner.

"This important experiment should teach our farmers not to cut their peas and beans too early in inclement autumns; which are so frequently seen to become shrunk and shrivelled in the barn or granary, and inclined to rot from deficient ripeness, and consequent softness or moisture; and thus contain much less flour in proportion to the husk or bran.

"3. The wheat produced after land has been much limed, is believed to be thinner skinned, and to yield more good meal, than other wheat, and to make better bread. On this account I suppose one use of lime is to forward the ripening of seeds by converting their mucilage sooner into starch or oil; as according to the experiments of M. PERMENTIER, the goodness of bread depends much on the quantity of starch contained in it; who found, that if the starch taken from eight pounds of raw potatoes, by grating them into cold water, was mixed with eight pounds of boiled potatoes, as good bread might be produced as from wheat flour.

"4. The seeds of some plants, which also propagate themselves by bulbs at their roots, will not ripen in this climate naturally, as the orchis; but are said to ripen, if the new bulb be cut off early in the season; or if the propagation by their roots be retarded or prevented by confining them in garden-pots, as the lilly of the valley; and it is probable, that the seeds of potatoes might be rendered more perfectly ripe, and in consequence, better for the cultivation of new varieties; if the young roots were taken away early in the season from that, which is to bear seed; or if they were confined in garden-pots.

"If the orchis could by these means be cultivated from seed on moist meadows or morasses, it might become a profitable article of husbandry; as when it is scalded in boiling water, and the peel rubbed off, it is sold by the name of salep, and might become a nutritive article of diet, like sago and vermicelli, if it could be propagated at less expense.

"It is also probable, that Jerusalem, or ground artichokes, *Helianthus tuberosus*, might be induced

to ripen its seeds in this country, if the new roots from a few of the forwardest plants were taken away early in the season, or if they were confined in garden-pots. And if this plant could be propagated by seed, it might make an useful product in agriculture, as horses are fond of the leaves, and swine of the roots ; both of which are produced in great quantity ; and as the latter contain much sugar, they must be very nutritive ; and in respect to their culinary use, are remarkably grateful to moist palates, as well as nutritive, when cut into slices, and baked in beef or mutton-pies ; but are said to be flatulent in the bowels of those whose digestion is not very powerful ; a property which might be worthy attention, where the propensity to fermentation is required, as in making bread with potatoes, or in the distillery.

" It is also probable, that if the large new root-suckers of other perennial plants, which do not bear bulbous or tuberous roots, and which are late in ripening their seeds, or do not ripen them perfectly in this climate, were cut or torn off early in the season, as of the *Rheum palmatum*, palmated rhubarb, or *Rheum hybridum*, mule rhubarb ; or if their roots were confined in garden-pots, that they might be more liable completely to ripen their respective seeds.

" IV. 1. *To generate the best kinds of seeds*, the most healthy plants must be chosen, and those which are most early in respect to the season ; these should be so insulated, as to have no weak plants of the same species, or even genus, in their vicinity, lest the fecundating dust of weaker plants should be blown by the winds upon the stigmata of the stronger, and thus produce a less vigorous progeny.

" Where new varieties are required, the male dust of one good variety, as of the nonpareil apple, should be shed upon the stigmas of another good variety, as of the golden-pippin ; and it is probable some new excellent variety might be thus generated.

" Mr. Knight has given a curious experiment of his impregnating the stigmas of the pea-blossoms of one variety with the farina of another. He says, *Treatise of Apple and Pear*, p. 42, " Blossoms of a small white garden-pea, in which the males had previously been destroyed, were impregnated with the farina of a large clay-coloured kind with purple blossoms. The produce of the seeds thus obtained were of a dark grey colour, but these having no fixed habits, were soon changed by cultivation into a numerous variety of very large and extremely luxuriant white ones ; which were not only much larger and more productive than the original white ones, but the number of seeds in each pod was increased from seven or eight to eight or nine, and not unfrequently to ten. The newly made grey kinds I found were easily made white again by impregnating their blossoms with the farina of another white kind. In this experiment the seeds, which grew towards the point of the pod, and were by position first exposed to the action of the male, would sometimes produce seeds like it in colour, whilst those at the other end would follow the female.

" In other instances the whole produce of the pod would take the colour of one or other of the parents ; and I had once an instance in which two peas at one end of a

pod, produced white seeds like the male, two at the other end grey ones like the female, and the central seeds took the intermediate shade, a clay colour. Something very similar appears to take place in animals, which produce many young ones at a birth, when the male and female are of opposite colours. From some very imperfect experiments I have made, I am led to suspect that considerable advantages would be found to arise from the use of new or regenerated varieties of wheat, and these are easily obtained, as this plant readily sports in varieties, whenever different kinds are sown together.

"2. The white and blue peas sown in fields as well as in gardens, sometimes possess the property of becoming soft by boiling, at other times not. This circumstance is said to depend on the nature of the soil, but has not yet been sufficiently investigated; perhaps the greater or less maturity of the peas at the time of reaping them may have more or less contributed to fill their fibrous cells or divisions with mucilage or starch. The greater or less mealiness produced by boiling potatoes seems to be an analogous circumstance, and is thought by some to arise from the nature of the soil rather than from the species or variety of the planted root.

"The mealiness of some boiled potatoes, and the softness of some boiled peas, may occasionally be affected by the acidity of the spring water, in which they are boiled; but is generally, I suppose, owing to the mucilage of some of them, being more or less coagulable by heat, than that of others. Something similar to which obtains in animal mucus, as the crystalline humour of the eyes of fish, become hard and opake by boiling; while the skins of animals, and the tendons of their feet, become a soft mucus or jelly by boiling; and some of the liquids, which are found in the cells or cavities of the body in dropsies, are observed to coagulate by heat, and others to become more fluid. The causes of this difference merits further enquiry.

"V. 1. *To collect good seeds*, according to the observations of Mr. Cooper of Philadelphia, consists not in procuring new seeds from distant places, as is generally supposed, but in selecting the best seeds and roots of his own; which though he has continually sown or planted them in the same soil, every article of his produce is greatly superior to those of any other person, who supplies the market, and they seem still in a state of improvement. He believed that no kind of incest would degenerate the breeds of vegetables, and therefore adopted the plan of Mr. Bakewell, in England, in respect to quadrupeds, who continued to improve his flocks and herds by the marriages of those, in which the properties he wished to produce were most conspicuous without regard to consanguinity or incest.

"Mr. Cooper was led to his present practice, which he began more than forty years ago, by observing that vegetables of all kinds were very subject to change with respect to their time of coming to maturity, and other properties, but that the best seeds never failed to produce the best plants. Among

a great number of experiments, he particularly mentions the following.

"About the year 1746, his father procured seeds of the long watery squash, and though they have been used on the farm ever since that time without any change, they are at this time better than they were at the first.

" His early peas were procured from London, in the year 1756, and though they have been planted on the same place every season, they have been so far from degenerating, that they are preferable to what they were then. The seeds of his asparagus he had from New-York, in 1752, and though they have been planted in the same manner, the plants are greatly improved.

" It is more particularly complained of, that potatoes degenerate, when they are planted from the same roots in the same place. At this, Mr. Cooper says, he does not wonder, when it is customary with farmers to sell or consume the best, and to plant from the refuse; whereas having observed that some of his plants produced potatoes, that were larger, better shaped, and in greater abundance than others, he took his roots from them only; and the next season he found, that the produce was of a quality superior to any, that he had ever had before. This practice he still continues, and finds that he is abundantly rewarded for his trouble.

" Mr. Cooper is also careful to sow the plant, from which he raises his seed, at a considerable distance from any others. Thus, when his radishes are fit for use, he takes ten or twelve, that he most approves, and plants them at least one hundred yards from others that blossom at the same time. In the same manner he treats all his other plants, varying the circumstances according to their nature.

" About the year 1772, a friend of his sent him a few grains of a small kind of Indian corn, not larger than goose-shot, which produced from eight to ten ears on a stalk. They were also small, and he found that few of them ripened before the frost. Some of the largest and earliest he saved, and planted them between rows of a larger and earlier kind, and the produce was much improved..... He then planted from those that had produced the greatest number of the largest ears, and that were the first ripe, and the next season the produce with respect to quality and quantity was preferable to any, that he had ever planted before.

" The common method of saving seed corn, by taking the ears from the heap, is attended, he says, with two disadvantages; one is the taking the largest ears, of which in general only one grows on a stalk, which lessens the produce; and the other is taking ears that ripen at different times.

" Many years ago Mr. Cooper renewed all the seed of his winter grain from a single plant, which he had observed to be more productive, and of a better quality than the rest; which he is satisfied has been of great use. And he is of opinion, that all kinds of garden vegetables may be improved by the methods described above, particular care being taken that different kinds of the same vege-

tables do not bloom at the same time near together; since by this means they injure one another."... *Communications to the Board of Agriculture, vol. I. part 3. Letter from* Dr. Priestley.

"2. As the varieties of plants are believed to be produced by different soils and climates, which varieties will afterwards continue through many generations, even when the plants are removed to other soils and climates, it must be advantageous for the agricultor to inspect other crops as well as his own; and thus, wherever he can find a superior vegetation, to collect seeds from it, which is more certain to improve his crops, than an indiscriminate change of seed.

"But where seed corn is purchased without a previous observation of its superior excellence, perhaps it would be more advantageous to take that from better kinds of soil, and from somewhat better climates; as the good habits acquired by such seeds may be continued long after their removal to inferior situations. And on the contrary, care should be taken not to collect a change of seeds from worse climates or inferior soils, unless the agricultor is previously certain that they are of a superior kind.

"VI. 1 *To determine the goodness of seeds*, the weighing a given measure of them may generally be esteemed a criterion; as it is known, that when seeds are put into cold water, those which are less perfect are liable to swim, and the sound ones to sink; thus the imperfect seeds of rye-grass and of clover may be detected by throwing a spoonful of them into water; but the seeds of rye-grass are said to be frequently adulterated by a mixture of the seeds of twitch or dogs' grass, which can only be discovered by an experienced eye. This even is said to be a test of the goodness of malt; as those grains which are not perfectly germinated will swim with one end upwards, I suppose the root end; and those which are perfectly germinated swim on their side, whilst the sound ungerminated barley sinks in water.

"It is therefore a proper criterion of good seed-wheat to cast it into salt and water, just so saline as to float an egg; as the more salt is dissolved in the water, the heavier it becomes; and hence none but quite sound grains of wheat will sink in this brine; and that which swims is properly rejected. This rejection of the light grains by steeping wheat in brine, is probably of greater consequence to the ensuing crop, than the adhesion of any salt to the grain, which has been believed to destroy the eggs of insects supposed to adhere to it, or to fertilize the soil.

"2. The weight of a given measure of corn will also with considerable certainty, discover the quantity of husk or bran contained in it, compared to the quantity of flour; as that grain, which is cut too early, or which is otherwise not quite ripe, as happens in wet seasons, shrinks in the barn or granary, and becomes wrinkled, and has thus a greater proportion of skin or bran, than that which has been more perfectly ripened, and will hence weigh lighter in proportion.

"A test of this kind may enable us to determine whether peas and beans, or oats, are preferable in

respect to economy as provender for horses. A strike or bushel of oats weighs perhaps forty pounds, and a strike or bushel of peas and beans perhaps sixty pounds; and as the skin of peas and beans is much less in quantity than that of oats, I suppose there may be at least fifteen pounds of flour more in a bushel of peas and beans than in a bushel of oats.

"There is also reason to believe, that the flour of beans is more nutritive than that of oats, as appears in the fattening of hogs; whence according to the respective prices of these two articles, I suspect, that peas and beans generally supply a cheaper provender for horses than oats, as well as for other domestic animals. But as the flour of peas and beans is more oily, I believe, than that of oats, it may in general be somewhat more difficult of digestion; hence when a horse has taken a stomach full of peas and beans alone, he may be less active for an hour or two, as his strength will be more employed in the digestion of them, than when he has taken a stomach full of oats. According to the experiment of a German physician, who gave to two dogs, which had been kept a day fasting, a large quantity of flesh food; and then taking one of them into the fields hunted him with great activity for three or four hours, and left the other by the fire. An emetic was then given to each of them, and the food of the sleeping dog was found perfectly digested, whilst that of the hunted one had undergone but little alteration.

"Hence it may be found advisable to mix bran of wheat with the peas and beans, a food of less nutriment, but of easier digestion; or to let the horses eat before or after them, the coarse tussocks of sour grass, which remain in moist pastures in the winter; or lastly, to mix finely cut straw with them.

"3. Another way of distinguishing light corn from heavy, is by winnowing; as the surface of the light grains being greater in proportion to their solid contents, they will be carried further by the current of air, which is produced by the fan; though the heavy grains would roll further on the floor after rolling down a grate to separate the dust; because their *vis intertiæ* would carry them further, after they are put in motion; and their surfaces would be resisted by the air no more than those of the lighter grains.

"4. Finally, there is reason to believe that a progressive improvement of many seeds exists during the warmer days of winter in our granaries, which probably consists in the process of the conversion of mucilage into starch; in the same manner as the harsh juices of crab-apples and of austere pears, are continually changing into sugar during the winter; both which processes are probably in part chemical, like the slow but perpetual change of sugar into vinous spirit, when the juices of sweeter apples and pears, or grapes, are put into bottles in the manufacture of cyder, perry, and wine.

"This improvement of wheat, and of barley, and of oats, is well known to the baker, the maltster, and the horse-dealer; as better bread is made from old wheat, and barley is converted into better malt in the vernal months; and horses are believed to thrive better, and

to possess more vigour, when they are fed with old than with new oats.

"VII. 1. The preservation of seeds next demands our attention. Those seeds which are liable to lie upon the ground, as peas and corn, when thrown down by stormy or wet seasons, should be gathered rather ealier; lest they should begin to germinate, as they lie upon the ground, and would hence become a kind of malt after drying. Other seeds should be gathered, before they would spontaneously fall from their pericaps, to prevent the loss which must otherwise ensue in the reaping, or mowing, and carrying them to the barn, which often amounts to as much as is necessary to sow the land, which produced it, as well as to supply the depredations of birds, insects and vermin.

"Mons. B. G. Sage accuses the farmers of some parts of France of collecting their wheat with many green weeds immediately after reaping it, and pressing it close together in their barns; by which the stack undergoes a fermentation with great heat like some hay-stacks; and that the corn is by this fermentation killed, and will not grow when sown like hay-seeds from a fermented hay-stack; and also that the gluten, or vegeto-animal matter of the corn is destroyed; and it, on that account, makes less agreeable and less wholesome bread; and lastly, that the straw is much injured by becoming mouldy. *Journal de Physique*, September, 1794.

"Mons. B. G. Sage adds, that the following process will discover whether wheat has been thus injured, which may be interesting both to the baker, and wheat buyer, who wants it for seed-wheat. Make a paste with flour and water, then wash it with your hands under water, which must be frequently changed, till it no longer becomes discoloured. The substance remaining on the hands is the gluten; if the corn be good, this is elastic, and will contract when drawn out; if the corn has begun to heat, it is brittle; if the corn has fermented, none of the gluten will be obtained.

"In this country, where corn is seldom cut too early, or pressed together on the stack, the principal circumstance required is to keep it dry; as the straw is not liable to ferment like new hay made with young grass, which contains sugar at every joint of the stem. To preserve a stack of wheat dry, a good cover of thatch may seem sufficient; but as this is liable to injury by vermin, it would be an additional security, if at the time of making the stack the sheaves were laid highest in the middle, and lower on every side, so that if any wet should find its way into the stack, it might drain onwards along the straw of the sheaves, which would thus act like thatch throughout the whole stack.

"There are instances of great durability of seeds, which have been preserved dry, and secured from either so great heat or so great cold, as might destroy their life or organism. Thus there is an account of the seeds of Indian-wheat, which grew well in a hot-house after having been kept 34 years, as was accurately ascertained. *Bath Society*, vol. v. p. 464. And it has been lately asserted, that many seeds of more than 100 years old, which were found in some old herbarium at Vienna, have

been made to germinate by the use of oxygenated muriatic acid and water. *Philos. Mag.* But if the organic life of a seed be destroyed by frost, or fire, or mechanic injury, putrefaction succeeds, and decomposition; as when the organic life of an egg is destroyed by violently agitating it, it is known soon to putrefy.

"To preserve seeds in barns or granaries our principal attention should be first to make them dry; and secondly, to keep them dry; because no seeds can vegetate without moisture. The art of drying most seeds must consist in duly ventilating them, especially on dry days; which may be done by frequently turning over the heaps of them: and to preserve them dry in this climate the door and windows of granaries should open to the south to receive the warmth of the sun, with apertures round the building for sufficient ventilation: which must be prevented from admitting rain or snow by sheltering boards on the outside.

"The heaps of corn should be surrounded with boards to keep them from contact with brick or stone walls; which, when warm moist south-west winds succeed cold north-east winds, are liable to precipitate the moisture from the atmosphere by their coldness, and to communicate it to all bodies in contact with them. For a similar purpose in stables some have put up a tall wooden trunk from the chamber to the room below, three or four feet square, and 10 or 12 feet high, with a sliding valve to draw out the corn below, which is poured in at the top; in three or four places a tin or wooden pipe full of holes is made to pass horizontally through the box to give air to the corn, the whole of which, when any of it is drawn out below, is moved in descending; and new surfaces of corn are applied to the air-holes of the horizontal tubes.

"The most secure way of preserving a great quantity of wheat, according to Mr. Tull, is by gently drying it on a hair-cloth in a malt-kiln, with no other fuel but clean straw, and no greater heat than that of the sunshine. In this situation the wheat remained from four to twelve hours, according to the previous dampness of it. Mr. Tull knew a farmer in Oxfordshire who purchased wheat, when it was cheap, and kept it by thus drying it for many years, and made a large fortune by selling it again in dearer seasons. The life of the seed was not destroyed by this process; as he asserts, that some of it grew, which had been kept in this manner seven years; whereas in drying potatoes on a malt-kiln so great heat was employed as to destroy their life, and violent putrefaction ensued.

"2. A due ventilation also, where corn is kept in the common warmth of the atmosphere of this climate, is necessary, except in seasons of frost, and also the admission of light; as otherwise the vegetable mucor, called mould, is liable to grow upon the corn, and injure it; as this mucor like some other funguses will grow, where there is little or no change of air, and without light, as in cellars, if there be sufficient moisture and warmth.

"3. Another method of preserving seeds may consist in secluding them from heat, as in granaries beneath the soil; which are so deep or so well covered with earth, as not to be affected by the difference of seasons. Thus there have been

instances of mustard-seed producing a crop on digging up earth, which had not been removed for many years, and, as was believed, even for ages. And in ice-houses it is probable, that not only seeds might be long preserved, but perhaps fruits also; if they were afterwards very gradually thawed by putting them into cold water, that they might not be destroyed by the too great stimulus of sudden heat.

"4. Where it has been necessary suddenly to collect and to preserve great heaps of corn, without shelter, for the provision of armies, some have moderately moistened the upper surface of the heap daily, which has occasioned the upper grains to grow, and thus to produce a sward or turf over those below; which, it is said, has thus preserved the lower part of the magazine. But in respect to granaries for the purpose of laying up very large quantities of grain to prevent famines in scarce years, I suppose the stacks of covetous farmers, who keep their corn in cheap years, hoping to sell it at a better price in scarce ones, is a more certain method, and a cheaper one to the public, to keep up a sufficient stock of corn, than by any other experiment that can be devised.

"5. Gardeners in general prefer new seeds to old for their principal crops, as they are believed to come up sooner, and with greater certainty, and to grow more luxuriantly. 'But peas and beans of a year old,' Mr. Marshall observes, 'are by some preferred to new, as not so likely to run to straw. And cucumbers and melons are best to be several years old, in order to their shooting less vigorously, and thence becoming more fruitful. But this principle is carried too far by some gardeners, who say these seeds cannot be too old, and will allow 10 years to be within bounds: three for cucumbers, and four for melons, however, is age enough.

'As to the age of seeds, at which they may be sown, it is uncertain, and depends much upon how they are kept; those of cucumbers and melons are good a long time, because very carefully preserved.

'Peas and beans will germinate very well at seven years of age; but the seeds of lettuces and kidney-beans, and some others, are not to be depended upon after a year or two; and, generally speaking, the smaller seeds are of the least duration.' MARSHALL *on Gardening*.

"6. Where seeds of a perishable nature are to be carried to, or brought from, distant countries, I suspect that covering them in sugar would be the most certain and salutary method of preserving them; and even, that flesh meat, cut into thin slices, and covered with sugar, or syrup, or treacle, would be better preserved than in brine, and afford a much more salutary nourishment to our sailors.

"Since I wrote the above, I have seen a paper in the *Transactions of the Society of Arts*, vol. xvi. from Mr. SNEYDE, of Belmont in Staffordshire, who having observed some seeds, which came accidentally amongst raisins, to grow readily, directed many seeds to be sent from the West-Indies, covered with raisins, and others in sugar, and others in the usual manner of sending them, and found, that those immersed in sugar or covered with raisins, both looked well, and grew

readily; whereas many of the others would not vegetate.

"Since the powder of fresh burnt charcoal is known so powerfully to absorb all putrid vapours, it is probable the seeds mixed with and covered with charcoal-dust, which has been recently burnt, or not long exposed to the air, might be successfully employed for the preservation of seeds either in long voyages, or in domestic granaries.

"VIII. 1. *To sow seeds advantageously*, it is probable, that those of our native plants might be suffered to drop on the surface of the earth in autumn, or to fall from their parent plant, covered only by their deciduous leaves, in which situation their fruit might contribute to nourish them, as our crabs and sloes; or defend them from insects, as the acrid husk of the walnut; or from birds, as the hard stones or shells of nuts and cherries, since this is the process of nature.

"But when the seeds brought originally from other climates are to be sown, an attention is required to the circumstance of season and of soil. Those which will ripen their seeds in the same year, are to be sowed in the early spring, and covered lightly with earth to preserve them from birds and insects; and should be buried thus beneath the soil, soon after it has been ploughed or dug, as its interstices are then replete with atmospheric air; which may be necessary to stimulate into elevation the plume of the embryon plant; as the moisture of the earth is necessary to stimulate the root into its elongation downwards..... Those seeds nevertheless, which will not perfect their vegetation in the same year must be sown in the early autumn; and though all seeds vegetate better, when placed but a little beneath the surface of the soil, as one inch, because they have then a better supply of atmospheric air, which may be necessary for their first growth, before they have acquired leaves above ground; yet as many foreign seeds may not be sufficiently hardy to bear our inclement winters, it may be necessary, as some believe, to bury them an inch and a half, or two inches, deep in the soil, to prevent the frosts from doing them injury, as well as to preserve them from the depredations of birds. And the drill semination, or sowing all kinds of seeds in rows, is the most convenient method for sowing them at a determined depth, and also for the purpose of keeping the young plants clear from weeds by the more easy application of the hoe.

"To sow many seeds earlier than is usually practised, is much recommended. There is a paper by Lord ORFORD in Mr. YOUNG's *Annals of Agriculture*, vol. ix. p. 385, who seems to have found considerable advantage by sowing barley so early as the seventh of February, three and an half bushels on an acre. But, as much moisture, with or without subsequent frost, is more liable to destroy the embryon in its very early state in the seed, than after it has shot out roots and a summit, and thus acquired some habits of life; this early sowing must sometimes be practised with caution. Seeds may, nevertheless, be sown still earlier in hot-houses, or in warm situations, as peas, beans, wheat, and may be afterwards transplanted in the vernal months with safety and advantage.

"The difficulty of determining the best season for sowing seeds in the spring, owing to the variation of the weather in the same latitude, as well as laying down the exact seasons for sowing in different latitudes, occasioned LINNÆUS to construct what he terms a calendar of Flora; which was afterwards adapted to this climate by STILLINGFLEET; which consisted in observing the first appearance of the root scions, or flowers of the uncultivated native vegetables; with directions to sow the *cerealia*, or harvest seeds, when such plants or flowers became visible. By attention to such observations on the uncultivated native plants in many climates, it is probable that ingenious tables might be produced, which might direct the best time of sowing the useful seeds in all latitudes, and in all situations.

"Another table of the climates, where plants grow naturally, and of their native situations in respect to moisture or dryness, hill or valley, with the kind of soil where they were originally found, might also contribute to their successful cultivation.

"2. In the gardens near large towns, where the land is more valuable and better manured, gardeners sometimes sow two or three kinds of seeds on the same ground, for the purpose of economy........ Thus Mr. MARSHALL observes, that, on the same ground they sow radishes, lettuces, and carrots; the radishes are drawn young for the table, the lettuces to plant out, and a sufficient crop of carrots is left; for carrots, if you wish them to be large, should not grow very near to each other.

"In defence of this mode of culture it is said, if one crop fails, the others may do well, and there is no loss of ground or time; and if all succeed they do very well.... Radishes and spinach are commonly sown together by the common gardeners, and many manœuvres of inter-cropping are made by them, as the sowing or planting between rows of vegetables that are wide asunder, or presently to come off, or in the alleys of things cultivated on beds.

"Thus if a piece of horse-radish be new planted; it may be top-cropped with radishes or spinach, &c. or if a piece of potatoes be planted wide, a bean may be put in between each set in every, or every other, row; a thin crop of onions upon new asparagus beds, is a common practice, drawing them young from about the plants." *Introduction to Gardening*. RIVINGTON.

"The farmer likewise, in the cultivation of grasses for feeding sheep, finds an advantage in sowing a mixture of seeds on the same ground, as rye-grass, trefoil and clover, which are said to succeed each other in respect to the production or maturity of their herbage. And, for the purpose of preventing smut, it may be useful, as I have before observed, to sow in the same ground, in separate rows, two kinds of wheat, one of a forwarder nature than the other; whence if the farina of one kind should be injured by wet weather, that of the other may impregnate the ears of both. The two kinds of wheat recommended are bearded and smooth-headed wheat, which are called by farmers cone wheat and Lammas wheat; of both of which there are many varieties, and it is asserted, that one third of cone wheat is frequently sown with two thirds of Lammas

wheat, and that the crops are much superior to either of them separately.

"In respect to kinds of soil, those should be chosen, which have been found by observation to suit particular seeds, both in regard to their nutritive properties, and the moisture and warmth of their situations. And for those seeds, which produce tuberous roots within the earth, previous to their flowering, as potatoes, parsnips, radishes, a soil of less cohesion should be found or prepared.

"3. Add to this that there are some seeds, as those of carrots, that are so difficult to be disseminated in uniform quantities, that it has been customary to mix them previously with sand or garden mould, for the purpose of giving them weight, or bulk, or to detach them from each other. And some even suffer them to begin to put forth their roots in such a mixture of moist sand or garden mould for the purpose of more regularly dispersing them.

"In dry seasons, the soaking seeds in water, a day or two before committing them to the ground, will forward their growth, as well as by artificially watering the ground before or after sowing them; and the soaking them in a solution of salt and water may have another advantage of giving an opportunity of rejecting the light seeds, which float, and perhaps of destroying some insects which may adhere to them; the sprinkling some kinds of seed with lime may also be of advantage for the purpose of destroying insects, if such adhere to them, and of attracting moisture from the air, or lower parts of the earth, or for its other useful properties; but where the seed, soil, and season are adapted to each other, none of these condiments are required.

"It may, nevertheless, on other accounts, be very advantageous to steep many kinds of grain in the black liquor, which oozes from manure heaps. Mr. Chappel, in the papers of the *Bath Society*, found great benefit by steeping barley in the fluid above mentioned for 24 hours, and skimming off the light grains. On taking it out of the water, he mixed wood-ashes sifted with the grain to make it spread regularly, and obtained a much finer crop, than from the same corn sown without preparation. To this we may add, that to steep the seed in a solution of dung in water, as in the draining from a dunghill, is believed in China both to forward the growth of the plant, and to defend it from a variety of insects, according to the information given to Sir George Staunton.

"There is an old proverb, 'sow dry and set wet;' but where the earth has been lately turned over by the plough or spade, there can be no bad consequence from sowing during rain in general; but in some clay grounds much softened by rain, if seed be put into holes, and a dry season succeeds, an impenetrable crust may supervene by the exhalation of the water, and the setting, as it is called, of the clay: but even this could not frequently occur, when seeds are sown in the moist weather of the autumnal months; but generally in both cases, the growth of the seed would be forwarded by the moisture.

"4. Where the fruit, which surrounds any kinds of seeds, can be sown along with them, it may answer some useful purpose. Thus

the fruit of crabs, quinces, and some hard pears, will lie all the winter uninjured, covered only with their autumnal leaves, and will contribute much to nourish their germinating seeds in the spring... So the holly-berry and the ivy-berry remain during the winter months uninjured by the rain or frosts, and undevoured by birds or insects, and contribute to nourish their germinating seeds, when they fall on the ground in the spring. The acrid husk of walnuts sown along with them preserves the sweet kernel from the attack of insects; the same must be the use of the acrid oil of the cashew-nut. The hawthorn possesses both a nutritive covering and a hard shell for the above purposes; and the seeds of roses are armed with stiff pointed bristles, as well as furnished with a nutritious fruit, so long known as an agreeable conserve in the shops of medicine, *conserva cynosbati*; the former constitutes a defence against insects, and the latter supplies a reservoir of nutriment for the germinating seeds.

" 5. To this should be added, that in our short and cold summers the viviparous buds of some vegetables are too luxuriant, and do not produce oviparous buds soon enough to ripen their seeds, as melons and cucumbers, and many other plants, in those seasons which are moister than common. It is believed, that by washing the seeds of melons and cucumbers from the saccharine and mucilaginous matter of their fruit, and by keeping the seed three or four years before it is used, that the viviparous buds become less vigorous, and the oviparous ones more numerous, and forwarder in their flowering; and for the production of earlier as well as of larger crops, all such luxuriant vegetables should be sown early in the vernal season, or in the autumnal months, if they are not too tender to bear the winter frosts."]

VEGETATION, is the natural process by which plants receive their nourishment.

Naturalists have formed various conjectures, to account for the mysterious phenomena occurring in vegetable nature; and though unable to discover the primary source from which plants are enlivened, yet it is now agreed, and proved, that all vegetables originate from *seeds*, each of which comprehends *three* parts, namely: 1. The *cotyledons*, or two porous lateral bodies or lobes, that imbibe moisture: 2. The *radicle*, or *eye*, which appears between the lobes: and, 3. The *plumula*, a small round body attached to the radicle, though wholly concealed within the cotyledons.

If a seed be deposited in the earth, in a favourable situation, it imbibes moisture, and evolves carbonic acid gas; but, if any oxygen gas be present, it is gradually absorbed by the seed, and the farinaceous matter, contained in the cotyledons, acquires a saccharine taste. Numerous vessels then appear in the lobes which convey the nutriment to the radicle, that progressively increases in size, and at length assumes the form of a *root*; strikes downwards into the earth; and thence derives the nourishment necessary for the support of the future plant....Now the cotyledons shoot above the ground, become leaves, and form what botanists have termed the *seminal leaves*. Thus, the *plumula* is gradually enlarged, and rises out of the earth,

spreading itself into branches, &c.; after which the seminal leaves wither and decay, while the different processes of vegetation are carried on in the plant, without their assistance.

[Plants, are very various, and of course, the structure of each species must have many peculiarities. Trees have principally engaged the attention of anatomists. We shall therefore take a tree as an instance of that structure of plants: and we shall do it the more readily, as the greater number of vegebles are provided with analagous organs, dedicated to similar uses.

A tree is composed of a root, a trunk, and branches. Each consists of three parts, the bark, the wood, and the pith.

The *bark* is the outermost part of the tree. It is usually of a green colour. If we inspect a horizontal section, we shall perceive that the bark itself is composed of three distinct bodies. The outermost of these, is called *epidermis*, the middlemost, is called *parenchyma*, and the innermost, or that next the root, is called the *cortical layers*.

The *epidermis* is a thin transparent membrane, which covers all the outside of the bark. It is pretty tough, is reproduced when rubbed off. In old trees it cracks and decays, and a new *epidermis* is formed. Hence, old trees have a rough surface.

The *parenchyma* lies immediately below the epidermis; it is of a deep green colour, very tender, and succulent. Both in it, and the epidermis there are numberless interstices which have been compared to so many small bladders.

The *cortical layers* form the innermost part of the bark, or that next the wood. They consist of several thin membranes, lying the one above the other; and their number appears to increase with the age of the plant.

The wood consists of concentric layers, the number of which increases with the age of the part. Next the bark, the wood is much softer and whiter, and more juicy than the rest, and is called *albernum* or *aubier*. The perfect wood is browner and harder, and the layers increase in density, the nearer they are to the centre.

The pith occupies the centre of the wood. It is a spongy body, containing numerous cells. In young shoots it is very succulent, but it becomes dry, as the plant advances, and finally disappears.

The *leaves* are attached to the branches of plants by short footstalks. The whole leaf is covered with the epidermis of the plant; containing many glands.

Plants are continually increasing in size. New matter is continually making its appearance in them, and this matter they must receive by some channel or other. Plants then require food as well as animals. Now, what is this food, and whence do they derive it? These questions can only be examined by an attentive survey of the substances which are contained in vegetables, and an examination of those substances which are necessary for their vegetation. This subject has already been treated of, under articles, Food of Plants, and Manure......Some additional remarks shall now be given.

The analysis of vegetables affords but three essential principles, namely, *carbon*, *hydrogen*, and *ox-*

ygen, or charcoal, inflammable air, and pure air; and the proportions between these principles form all the shades, varieties, modifications, which the vegetable creation exhibits. Analysis further shews, that vegetable fibre, when cleared of all extraneous matter, is scarcely any thing else than a congeries of carbon. But how is carbon conveyed into the body of the plant? It is well known, that pure carbon, such as is used for burning, mixed with pure, dry earth, affords no nourishment to vegetables; and it is also known, that when dead plants are so far decomposed, that their texture is softened or destroyed, living vegetables imbibe all their constituent principles. This difference appears to arise from hence, that, in the last case, the carbon remaining dissolved in the oily, resinous, or alkaline principle, the water, which has the property of disjoining these natural combinations, serves as a vehicle to convey them into the vegetable system. Air, heat, acids, and even rest alone, are sufficient to precipitate the carbon; so that, the agents proper to facilitate the concretion of the fibre, and to promote nutrition, are every where to be found. The principle of life, which governs and animates every organ, suitably divides this nutritive matter. It modifies the action of external agents, and presides over all the operations of this living laboratory. Hence it is easy to see, that hydrogen, carbon, or oxygen, predominates in the plant, according to the nature of the soil, exposure and climate, and according to the proportions in which these nutritive principles are presented.

Since the only part of plants which is contiguous to the soil is the root, and since the plant perishes when the root is pulled out of the ground, it is evident, that the food of plants must be imbibed by the roots. It is highly probable that the *great* changes, at best which the food undergoes after absorption, are produced, not in the roots, but in other parts of the plant. The sap, as Dr. HALES has shewn us, ascends with such impetuosity from the cut end of a vine branch, that it supported a column of mercury $32\frac{1}{2}$ inches high. It is certain, that the sap ascends through the wood, and not through the bark of the tree; for a plant continues to grow, even when stripped of a great part of its bark, which could not happen, if the sap ascended through the bark.

It is impossible to account for the motion of the sap in plants by capillary attraction, or by any mechanical or chemical principles whatever; we know indeed, that heat is an agent, but its influence cannot be owing to its dilating power; for unless the sap vessels of plants were furnished with valves, (and they have no valves) dilatation would rather retard than promote the ascent of the sap.

We must, therefore, ascribe it to some other cause; the vessels themselves must certainly act..... Many philosophers have seen the necessity of this, and have accordingly ascribed the ascent of the sap to *irritability*. SAUSSURE supposes, that the sap enters the open mouths of the vessels, at the extremity of the roots; that these mouths then contract, and by that contraction propel the sap upwards; that this contraction gradually follows the sap, pushing it

up from the extremity of the root to the summit of the plant.

This irritable principle is seen in many plants, particularly in the *stamina* of the barberries, which are thrown into motion when touched.

The sap ascends to the leaves, where it undergoes certain alterations, and is converted into the peculiar juices, which like the blood in animals, are afterwards employed in forming the various substances found in plants. Great part of the sap when arrived at the leaves, is thrown off by evaporation, by means of particular organs. What remains must be very different in its proportions from the sap. It is performed chiefly by the upper surfaces of leaves.

Leaves have also the property of absorbing carbonic acid gas from the atmosphere, and have been supposed to exhale much pure air. Hence they have been universally deemed highly useful, when planted near a house, but though useful as a source of shade, yet the following observations will shew that their benefit does not depend upon the supposed addition of pure air derived from them, to the atmosphere.

The air of the atmosphere, according to the most celebrated chemists, is composed of twenty-two parts of oxigenous gas or air, and seventy-eight parts of azotic gas. There is a constant consumption of the oxigenous portion of this air, by the burning of combustible bodies; by the respiration of animals; by the fermentation and putrefaction of vegetable and animal substances; and by the calcination of metals. The oxigenous gas, decompesed by respiration and combustion only, in the city of London, is supposed to amount to the enormous quantity, of five millions cubic feet an hour. (NICHOLSON'S *Philosophical Journal*, vol. v. p. 184.)

The atmospheric air of Great Britain, France, of parts of Africa, and of America, has been examined by philosophers, and has been found to be exactly of the same degree of purity.

The oxigenous gas contained in it, is in the same proportion, at all times and in all places, in rainy or in dry weather, in depth of winter, and in the middle of summer, on the land and on the ocean, in the crowded city and remote village.

In consequence of a most valuable discovery, made by the illustrious Dr. PRIESTLEY, that growing vegetables under certain circumstances, exposed to the light of the sun, yield oxigenous gas; an opinion has been adopted, that they are the sources of the oxigenous part of common air.

This sentiment has been adopted by the chemists of all nations, but has lately been controverted by Dr. JAMES WOODHOUSE, professor of chemistry in the University of Pennsylvania. (NICHOLSON'S *Philosophical Journal*, June, 1802.)

The Doctor reasons in the following manner:

1st. He says, whenever oxigenous gas has been obtained from vegetables, carbonic acid, (or fixed air,) has been present. Upon reviewing the experiments of Dr. PRIESTLEY, he finds that this circumstance has actually taken place. The Dr. exposed plants to the influence of light, in atmospheric air, in which spirit of wine, and wax, and tallow candles, had burned out; to air which had been vitiated by the death or putrefac-

tion of mice and fishes; and to air which had been frequently taken into his lungs, and found that the purity of the air, was in every instance restored. (PRIESTLEY on air. vol. iii. p. 247 to 347.)

In all these cases, carbonic acid, (which is composed of carbon and oxigen) was formed; the vegetable devoured its coal for food, by which means its oxigen escaped, in the form of pure air.

2dly. The seeds of Zea mayz (Indian corn), of *apium petroselinum* or parsley, of *lactuca sativa* or lettuce, of *cucurbita citrullus* or the water melon, of *phaseolus sativus* or beans, and of *raphanus sativus* or radishes, were planted in earth, and made to vegetate in atmospheric air, confined over water in vessels of white glass, and exposed to the action of solar light. This air, when examined at various times, was found to be reduced in purity, and when its oxigenous portion was completely absorbed, the plants died. Its oxigen united to the coal of the cotyledons of the seeds, or to that of some animal or vegetable matter contained in the earth, in which they were planted, or to that of some decayed portion of the living leaves, and formed carbonic acid, quicker than the living plant could decompose it. To these experiments, we may add, that the celebrated and accurate SCHEELE observed, that beans growing in atmospheric air, always rendered it impure.

3dly. Young plants of *datura stramonium* or Jameston weed, of *phytolacca decandra* or the poke, of Zea mayz or Indian corn, &c. growing in earth, were exposed to solar light in from forty to eighty ounce measures of atmospheric air, which was examined at various times, from one hour to thirty days after the plants had been placed in it. Carbonic acid gas was generally formed, and whenever this circumstance happened, the purity of the air was diminished.

When a plant in perfect health, growing in a soil, which contains little vegetable or animal matter, is confined in atmospheric air, it will live a long time without producing any change in it. Many of the vegetables, which were the subjects of these experiments, did not affect the air in five days; some diminished its purity in three hours, and others altered it in a most slow and gradual manner, causing little change in it, in 20 days.

4thly. Many of the same kind of vegetables were also confined in forty ounce measures of oxigenous gas, which had been well washed in lime water, and the purity of this air was very generally lessened, carbonic acid being formed.

5thly. A small handful of the healthy leaves of a variety of plants, containing no decayed parts, were exposed during four, six, and eight hours to the influence of the light of the sun, in atmospheric air confined by water, and its purity was found to be neither increased nor diminished.

6thly. The leaves of various vegetables gathered promiscuously, exposed in the same manner, generally diminished the purity of atmospheric air, several degrees.

7thly. A handful of the leaves of several hundred different plants, among which may be mentioned, those of the apple, pear, peach, poplar, fringe, and persimmon trees, were separately exposed during several hours in glass ves-

sels to solar light, in forty ounce measures of pump water, and from five to nineteen dram measures of oxigen air, were produced in each vessel. Upon analysing the water, it was found to contain carbonic acid, with which it had been impregnated from a necessary, which stood within a yard of the pump.

8thly. The leaves of 13 different plants, were separately exposed in the usual manner, in forty ounce measures of the water of the river Schuylkill, and about ten dram measures of air were procured, the principal part of which was azotic gas, which was disengaged from the water. No carbonic acid could be detected in the water of this river.

There are three wooden bridges erected over the Schuylkill, which rest upon large wooden logs, upon which great quantities of a species of conferva grow, and which is covered by the water. Upon viewing this vegetable when the sun shone upon it, for several hours, at different times, for several years, no air could be seen to form upon it, or to rise through the water.

9thly. The leaves of the same vegetables were exposed to light, in the same manner, in the same river water, impregnated with four quarts of the water, saturated with carbonic acid, from the carbonate of lime and the sulphuric acid; and 77 dram measures of oxigenous air of a very high degree of purity, were obtained.

10thly. No oxigenous air could be procured by exposing vegetable leaves in boiled, distilled, rain, or lime water; a proof that they do not decompose water.

11thly. Atmospheric air was impregnated with carbonic acid gas, and an handful of the leaves of nine different vegetables, were separately exposed in it, to light, seven hours. The fixed air disappeared, and the atmospheric air was greatly increased in purity.

12thly. The limbs of trees covered with healthy leaves, and some vigorous evergreens growing in their natural soil, were confined from one day to a month, in atmospheric air over water, and exposed to light, and its purity was never found to be increased, but was generally considerably diminished.

These experiments incontestibly prove, that whenever oxigen gas has been obtained from vegetables, by exposing them to the influence of solar light, carbonic acid has been present, and that it is from the decomposition of this gas, that the pure air is obtained.

As it is acknowledged, that the leaves of plants separate the oxigen from carbonic acid, it may be said, that the oxigenous portion of atmospheric air is supplied by the decomposition of this gas, as it is always found in the atmosphere. The quantity of carbonic acid, accidentally diffused, in atmospheric air, (for it is not one of its component parts) is reckoned to be about one part in an hundred. It must however vary in different places. We would expect to find the most of it in cities, where it is formed by combustion, respiration, fermentation and putrefaction. If one measure of the air of any great city, be passed up over lime water, in an eudiometer, no carbonate of lime will be formed, so that the quantity of carbonic acid in this air, must be extremely small. As this gas is also seized upon by alkalies, earths and metals, and absorbed by water,

the proportion of it in the atmosphere may be less than one part in ten thousand.

When we consider likewise, that the oxigen is never separated from the carbonic acid by leaves, but when they are exposed in contact with it to the light of the sun, and that every perforation made in a living leaf, however minute by an insect, causes the part to decay, and absorb oxigen by day and by night; and that in the autumn, in some countries, all leaves fall on the ground, ferment and putrify, and thus diminish the purity of common air, and that the petals and fruit of vegetables, have the same effect, we must pronounce, that the oxigenous portion of atmospheric air cannot be supplied by vegetation.]

Many valuable hints respecting the phenomena of vegetation, are contained in Dr. INGENHOUSE's "*Experiments on Vegetables*," &c. (8vo. 6s.), and also in Mr. GOUGH's "*Experiments and Observations on the Vegetation of Seeds*," inserted in the 4th vol. of the "*Memoirs of the Literary and Philosophical Society of Manchester*."

VEINS, in the animal body, are membranous canals, destined for the purpose of re-conveying the blood from the arteries to the heart. They run chiefly by the sides of arteries, but more towards the surface; and are, like these, composed of three membranes, namely, the interior coat, resembling the arterial; the second, or cellular; and the third, consisting of longitudinal fibres; the whole being, however, of a more delicate texture, so that they are apt to rupture, in consequence of too great expansion. Farther, the veins are provided with numerous thin, semi-lunar valves, which prevent the return of the blood; a circumstance that would otherwise frequently occur, from a want of muscular power in the venous system: hence, no pulsation can take place in these vessels. The blood which they receive from the arteries, flows but slowly to the heart; and is conveyed thither by the contractility of their membranes; the propulsion of the succeeding columns of that fluid from the arteries; the contraction of the muscles; and by the act of respiration.

In cases of venesection by the lancet, the blood being generally taken from the veins, we deem it a duty, to caution our readers against resorting to unskilful hands, where such an operation becomes necessary; as, from the contiguity of the arteries, as well as the nerves and tendons, serious injuries may be sustained, and which, in many cases, have proved fatal.....If, during blood-letting, the patient become faint, it will be advisable to admit fresh air into the room; to give mild cordials; and to lay the person in a horizontal posture; by these means, the circulation will again be restored, and all farther inconvenience be obviated.

For an account of the varicose aneurism, an affection of the veins, we refer the reader to the article ANEURISM.

VELVET-LEAF. See TREE-MALLOW.

VENEERING, is a species of inlaying or marquetry, in which several thin leaves, or slips of fine wood, are applied to a groundwork of common wood: it is performed in the following manner:

The wood intended for veneering, is first fixed in a vice, or sawing-press, where it is divided into

leaves, not exceeding one line in thickness. Such leaves are then cut into small slips, of various forms, according to the design proposed; and, when the ground-work is duly prepared, they are cemented by means of glue, and submitted to the action of a press, till the whole becomes perfectly dry; after which the articles are scraped and polished.

VENTILATION. See vol. i. p. 24. also the article GRANARY.

[The reader is referred to the above parts of this work for observations on ventilation. And the following judicious remarks on this important subject, by Sir GEORGE O. PAUL, deserve particular attention. They are extracted from the *Trans. of the Society of Arts, London.*]

" Although particular conclusions may be controverted, I may venture to assume as the basis of all observations on this subject,

" First, that a certain and frequently renewed supply of vital air is essential to the purposes of animal life; and the more regular and uninterrupted that supply, the more favourable will it be to health.

" Secondly, that where the quantity of atmospheric air introduced into an apartment is less than nature has bestowed in free circulation, her purpose is in a degree counteracted; and although the breathing impure air (*i. e.* air despoiled of its natural proportion of vital air) for a short time may not produce an immediate sensible effect, an injury may arise to the constitution, proportionate to the extent of that time. And farther, when (as in the ordinary intercourses of Society in London) persons are in the habit of placing themselves, during a considerable portion of every twenty-four hours, in a situation to breathe in this defective atmosphere, the accumulated consequences may be serious and important.

" Thirdly, that in rooms from which currents of fresh air may not be excluded, they may be so injudiciously directed as to be useless and injurious. And,

" Fourthly, that if, in addition to the consumption of vital air by the lungs, the persons of those assembled in any apartment should be filthy, should their clothing (particularly that made of woollen) have been so long worn as to have absorbed any considerable portion of the perspiration of the body, or should the apartment itself be damp and foul, the vital properties of the air will be contaminated; and although instant death may not ensue (which has been known to be a consequence), the fevers emphatically termed the gaol, hospital, or ship fever, from its usually originating in these places, will be generated with a degree of malignancy proportionate to its causes, and, being so generated, will become infectious with a like degree of malignancy.

" It is about twenty years since the deleterious consequences of inattention to ventilation were set forth by Mr. HOWARD. So strong and so general was the conviction of the public mind, not only as to the evil pointed out, but regarding the remedies proposed by that indefatigable philanthropist, that the legislature thought fit to adopt the whole of his principles, and to make them the basis of several positive laws, under the direction of which the greater number of prisons of the kingdom have since been reconstructed, and the

remainder (with few exceptions) altered in conformity to the principle recommended by him, namely, *that of introducing currents of fresh air* INTO *and* THROUGH *every apartment.*

" In these prisons, where attention is also paid to personal cleanliness, I venture to say, the gaol fever is unknown, unless brought into them by prisoners committed in a state of previous infection.

" By equal exertion on the like principles, the healthiness of the ships of war has been so improved, that they are no longer sources of this desolating pestilence.

" Regarding hospitals, I fear it cannot be proved that a relief so complete has been effected. Mr. HOWARD was not sparing in his strictures on the management of this important branch of our public institutions; but the improvement he suggested went no farther than simply the introduction of fresh air. The reconciling this advantage with that generally diffused warmth, necessary in sick rooms, seems to have escaped his contemplation.

" Of the several hospitals constructed since his observations were made public, most have been planned with a view to facilitate the passage of outward air through the wards. The directors of old hospitals have adopted alterations more or less tending to the same purpose; but all seem to have rested at this point: yet, considering the importance of pure air to patients, during the tedious cure of compound fractures, and other accidents or diseases, together with the no less important object of securing them from currents of cold air, it cannot be denied that much still remains to be effected.

" In the construction of the larger work-houses, termed Hundred-houses, similar principles of ventilation have been attended to with evident success, in preserving the health of the inhabitants; but with respect to parish workhouses on the *lesser* scale, school rooms (both for boys and girls in every rank of life), manufactories, apartments for public lectures, and ladies assembly-rooms, these, together with the circumscribed cottages of the poor, remain in a state most dangerous to health from imperfect ventilation. To these sources, and to no other, may be traced the few putrid and contagious diseases which occasionally show themselves amongst us; and which, to the credit of *free ventilation*, can no longer justly be called gaol or ship fever.

" At a period of demonstrated success of the doctrine recommended by Mr. HOWARD, and adopted by his disciples, the valuable essays and experiments of COUNT RUMFORD appeared before the public. Whilst opening to the world a new and most useful system of domestic philosophy, he has advanced opinions unfavourable to those means by which these important effects have been produced.

" In theory this ingenious philosopher and friend of mankind has decidedly negatived the necessity, and questioned the propriety, of ventilation, by the admission of currents of air. In the construction of those buildings most immediately under his direction he has certainly adopted a *practice* of a direct opposite tendency.

" Opinions of such authority could not fail to be respected; they must at least raise a doubt in the

mind of the most confident advocate of an opposite theory.

"As the Count's observations and practices tend to invalidate a material part of that system, in the pursuit of which immense sums had been *confidently* expended in the kingdom, and respecting which I bear more than a common share of responsibility, I felt myself peculiarly called upon to scrutinize his objections, and to obviate such as should appear to be denied by experience; but, at the same time, certainly to abandon whatever ground could not be fairly maintained by a result.

"As my conclusions on the point disputed are formed on circumstantial observations made within a prison and hospital immediately under my own eye, and as these particular institutions have not unfrequently been resorted to as examples for imitation, a detailed reasoning regarding them may serve for general application.

"The county gaol at Gloucester is constructed on the principles of admitting air to pass into and through it, in strait lines, from one extremity to the other. There is no obstruction to a freedom of current, other than as the streams of air passing through the long passages, open at each end, move with the greater velocity, they of necessity carry with them the weaker currents, passing into and through the cells at right angles.

"From the time this prison was opened in 1791, until the year 1800, about 1300 persons were committed to it; and, on the average, about 100 prisoners were constantly confined in it. In these nine years the number of deaths has been thirteen; and of these, four sunk under the effects of disease brought into prison with them. During the last year, the prison has been crowded in an uncommon and very improper degree: two hundred and fourteen have been confined; and the average number has been one hundred and sixty-seven. One prisoner only has died (a woman aged sixty) in the month of October last. At the opening of the spring assizes, 1801, (the time of the greatest numbers) there was not one prisoner sick, or in the hospital ward.

"By this statement it appears, that the proportion of deaths is so much below the common average, in the ordinary situations of life, that the healthiness of this abode may be said to be peculiar: and it is in proof, that however currents of air may be found injurious to particular constitutions, they are not unfavourable to general health.

"Every prisoner in this gaol, when not in the infirmary-ward, sleeps in a room containing from 52 to 57 feet of superficial space, built with brick, resting on an arch, and arched over; so that no air can enter it but through the openings provided for it. As air is constantly passing immediately under it, and round it on every side, it is necessarily dry: it is ventilated by opposite openings near the crown of the arch. To that opening, which is toward the outward air, there is a shutter, which the occupant may close at will; but it is so imperfectly fitted, that, when closed, a considerable portion of air must enter by its sides. The opposite opening to the passage, the prisoner has no means of closing in any degree.

"During the ten years these rooms have been inhabited, there have been three winters in which

the cold has been intense. As I had considerable apprehensions of the effects of this situation in severe weather, I directed the surgeon of the gaol to be constant in his attention; and particularly in the report of his observations during the inclemency of these seasons. I also made a point frequently to visit the prison, and to examine every prisoner as to the effects apprehended; and, as much to my surprize as to my satisfaction, notwithstanding the querulous disposition of persons in their situation, I never heard a complaint from old or young, from male or female, suffering by cold in the night apartments*. And farther it is the decided opinion of the two able physicians who have most liberally undertaken to superintend the health of this prison, that no ill consequences have arisen from prisoners sleeping in the situation above described.

"I must contend, therefore, it is a fact established by experience, that in a room containing not more than from 415 to 439 cubical feet of air, in which there is no fire, the body of a person sleeping under a proper allowance of woollen bed-clothes will so far warm the atmosphere around him, or to speak more conformable to modern doctrine, so little of the heat generated in the body will be carried off by the surrounding air, that he will not suffer by a current † passing at a distance over him, provided the apartment be secured from damp. On the points, therefore, of warmth and ventilation *combined* it must surely be allowed (regarding rooms so constructed) there is no farther *desideratum*.

"Prisoners, on their rising in the morning, are removed into small working-rooms or wards situated on the ground-floor. These day apartments are, in like manner, constructed with cross openings near the cieling or crown of the arch; but there is also in each of them an open fire-place. Respecting these apartments, my observations tend to *confirm* Count Rumford's objection to open fires, and his preference to closed stoves. Nay, farther, I am disposed to admit, that openings for free ventilation are incompatible with strong fires in open fire-places.

"It is certain that, in rooms so provided, the danger arising from impure air is completely guarded against; yet this advantage is gained at the risk of another evil, which, though not so important, should, if possible, be avoided.

"The air which in the same room without an open fire-place would pass inwards by one opening, and outwards by the other, being attracted by the fire to supply the constant rarefaction in the chimney, passes inwards from both openings towards the fire place, and the body of a person placed near it, being in its current, is exposed to the danger of partial chill. To this circumstance, in these

* Fahrenheit's thermometer has never been observed to be below 33° in the severest nights, in the middle region of a cell in which a prisoner was sleeping; whereas, in the ordinary apartments of a dwelling-house, water is frequently known to freeze by a bed-side.

† The term "current" is not to be understood in a stronger sense than merely to signify that species of circulation of air, which is directed in strait lines from point to point, by the action of any efficient cause.

apartments, I am inclined to attribute the few complaints of a dysentery or aguish tendency, which have occasionally interrupted the general health of this prison.

"In the hospital, the scene of my observations, the morbid effects of foul air in the wards have, until lately, been no otherwise relieved than,

"First.....By introducing currents of fresh air by the windows, with an improved mode of hanging the upper sash, peculiar to this hospital, by the effect of which the current of air admitted is turned upwards to the cieling, and prevented from descending on the patients, whose beds are placed under the windows;

"Secondly.....By piercing holes in the cieling of the wards, and by means of plastered channels or wood funnels, leading the foul air, rising into them, to the roof.

"In warm weather, when the doors of the wards are open, and the fires low, these channels or funnels operate with considerable effect. Much foul air will by its relative specific lightness (not being counteracted by a stronger power) ascend them and escape; a farther portion will pass off by the windows opening to the leeward, and ventilation may be duly effected.

"But, on the contrary, when the doors are shut, and strong fires are made, these will inevitably attract the currents of air *inwards* and towards them, from all the openings; and should patients be situated in their course, the effect cannot fail to be injurious.

"Besides, as the windows are generally closed in the night, (the most important time for ventilation,) no other change of air takes place, but what is effected by the open fires, which, whilst supplied immediately from the middle region, are constantly consuming the best air of the room.

"Hence it appears that free ventilation, or the transverse passage of outward air, may be inconsistent with the general warmth required in the apartments of the sick; and that channels for the escape of the foul air, unassisted by a power more constant and decisive than the relative specific lightness of that air, is a mean inefficient to preserving a healthful respiration in the crowded wards of an hospital.

"As a remedy to these apparent defects in the ordinary mode of ventilation, it has been imagined that the draft, or determination of the air, to the funnels in the cieling of the rooms requiring ventilation, is accelerated by the operation of fire; and by causing an increased degree of rarefaction, at the termination of the funnel, to discharge the air rising to the cieling in a degree depending on the correct application of the apparatus and quantity of fuel consumed.

"In all rooms or apartments requiring ventilation, it is presumed that (according to the old system) channels or funnels are provided for the discharge of air ascending into them. These channels or funnels, so provided, should be rendered air-tight, and brought to terminate immediately under the fire intended to work them. The ash-pit and fire-place should be so closed, by doors, as to prevent the fire from drawing the air from the room, surrounding it..... The whole draft or consumption

occasioned by the fire will then be supplied from the further termination of the channel or funnel.

"This effect may be applied according to circumstances, either to the cieling of the room in which the fire is made, to the room below, or to that above it; and the draught thus produced may, by a proper apparatus, be increased or diminished at will.

"In the hospital in which I have made the first experiment of this design, I have caused a stove to be so formed as to answer the culinary purposes of the ward in which it is fixed, and at the same time to ventilate the ward beneath it; and no additional expense is created in fuel by the operation.

"By a fire made in one of these stoves, a ward beneath it, containing about 18,000 cubical feet, filled with patients, (and which, in spite of all former means, was ever remarkably offensive,) was in a few minutes so relieved of contaminated air, as to be sensibly felt by all the patients in it, without their perceiving any increased current.

"The principle of the means of ventilation adopted in this hospital may be applied with perfect facility to ships.

"By carrying the funnel from a cabin or ship stove, of any kind or dimension, (observing *only* to exclude the admission of surrounding air,) to the hold or under-decks, they may be as completely ventilated as the wards of an infirmary. In stormy weather, when the decks of a ship must of necessity be closed, the fires would perform a service which could no otherwise be attained; whilst, by the nature of the apparatus, the fire itself would be secured from the effects of the wind.

"If the stove or grate over a lady's drawing-room were properly fitted to this purpose, on the evening of her assembly, it might be set in action, and the room beneath cleared of its impure air, without recourse being had to the opening of windows: the openings in the cieling might be rendered ornamental.

"By applying the same principle to German or other closed stoves, the chief objection to their use in crowded rooms would be obviated; and I should then agree with COUNT RUMFORD, that in all rooms, where the indulgence of the habit of open fires was not in question, such stoves (if constructed of earthen materials) would afford a more 'genial warmth,' and a due circulation be at the same time effected.

"So fitted and constructed, they would be incontestably better than open fires for the wards of hospitals, poor-houses, manufactories, theatres for lectures, school-rooms, and prisons. Respecting the last-mentioned structures, I must farther observe, that if a sutler were appointed in public kitchens under due regulations, the present necessity of open fires for prisoners to cook individually for themselves, would be superseded, much to their advantage.

"On the other hand, I must also observe, that if closed stoves, acting on this principle, were adopted, COUNT RUMFORD's objections to the introduction of fresh air would be obviated, with regard to any room in which they should be in action, provided the opening through which it entered was made on a level with the cieling.

"Air entering at this level would, in the absence of open fires, be

acted upon by no other draft than the mouth of the funnel in the ceiling, and could not descend in currents to the lower region of the room.

"In a room so filled with company as to vitiate the air within it, the atmospheric air entering, being specifically heavier, would indeed descend, and be replaced by the ascending impure air; but, as it would not descend by a stronger impulse than its difference of specific weight, it must be slow in its motion, and would produce no sensible current."

To the above observations the Author annexes a description and plate of the stove in use for culinary purposes, and at the same time to ventilate the ward beneath it, which is highly worthy of being introduced into all houses crouded by living persons.

The following plan of ventilation was adopted in the large rooms of the house of industry in Dublin, upon the recommendation of COUNT RUMFORD.

There are two fire places, one in the office of the master of the work, the other in the hall of merit, with flues extending horizontally, at the height of five feet from the floor, to a chimney in the centre. These communicate a sufficient and equable degree of heat through the two great dining halls. Two of COUNT RUMFORD's loovers carry off the vitiated air, and a fresh supply of atmospheric air is obtained by small apertures, which are made at the bottom of the side walls, and covered with perforated boxes.

These loovers consist of three six-sided vertical wooden tubes, which passing through the roof of the building, project three or four feet above it, and communicate with the room below. By two of the tubes, placed at the two ends of the room, and terminating in two long wooden boxes, which are bored full of holes, and rest on the floor of the room, fresh atmospheric air from without is forced into the room, while the foul air is carried off by means of the third tube placed over the middle of the room, with its lower opening even with the ceiling. This tube is furnished with a register or damper. See 8th *Report of the Society for bettering the Condition of the Poor, London* 1799.

Ventilation, cleanliness, and the use of soap and water and scrubbing brush, will do every thing, (nay much more) than can be done by any substitutes for these essential requisites in our preservation from infection, and will continue to be employed by mankind, when the vile suffocating acid fumes of SMITH and MORVEAU will be forgotten.

The ventilation of ships is of great consequence to the health of those on board, to cargoes, and to the preservation of the timber of the vessel which are known to suffer very materially and rapidly from the action of confined air upon them. Even the durable LIVE OAK of Georgia is not proof against the corrosive effects of this agent, as the almost unexampled rapid decay of the United States national frigates built within the last eight years fully proves. It is known that the timbers of those ships were placed so close, as to prevent the free passage of any considerable current of air between them.

Various ventilators for ships have been proposed in England. Dr. HALE's and SUTTON's plans were used with success, and lately Mr. ABERNETHY of London, has

suggested some improvement on them, which are certainly worthy of attention by all concerned. An account of HALE's ventilators may be seen in the *Philosophical Transactions*; and that of ABERNETHY, in a late volume of PHILIPS's *Monthly Magazine*, and in Dr. GLEIG's supplement to the *Encyclopædia Britannica of Edinburgh.*

In the *Transactions of the Bath and West of England Society*, Mr. SOUTH also describes a ventilator for preserving grain on ship board.

The United States have not been without attempts on this important head. Mr. BENJAMIN WYNKOOP's contrivance consists of four bellows connected in a frame, and having their nozzels opening into one tube which descends from the deck to any distance in the hold of the vessel; and as the frame is connected with the side of the vessel, the bellows are worked without manual labour. Captains LLOYD JONES, IRVINE, and MOORE of Philadelphia, have all borne testimony in favour of the utility of the machine.

Mr. RICHARD ROBOTHAM of the city of Hudson, New-York, has also obtained a patent from the United States for an air pump ventilator. The following are the words of the patentee.

Air-pump-ventilator, for the ventilating of ships, mines, prisons, hospitals, &c. invented by RICHARD ROBOTHAM, *of the city of Hudson, (N. Y.)*

"It is a single bellows, fitted upon the top of a tube of wood, or a trunk made of plank, which, in a ship, stands in the lowest part of the hold, by the kelson, and runs up through the lower deck. The bellows is fixed on the top of this trunk, with a valve in the usual place, at the inlet. The outlet of the bellows is made of wood, with a square angle, which turns upwards, and a valve in the upright part, that shuts down, in such manner that the bellows fills from the bottom and discharges at the top. If the bellows discharges one barrel at a time, the insides of the trunks must be six inches square; it will be then sufficient for a vessel of three hundred tons; but if they are four or five times this size, the machine may be worked by the labour of one man: or, about one square inch of enlargement may be made in the trunks to éach gallon in the bellows: then it will fill and discharge about twenty times in a minute. The bellows may be made in various shapes and sizes at pleasure. This improvement consists altogether in filling the bellows at, or from the bottom, and discharging the contents at the top, above the upper deck, or out of a porthole."]

VENUS-COMB. See NEEDLE, the Common Shepherd's.

VERDIGREASE, or ACETITE OF COPPER, is a kind of rust usually prepared from that metal, by corroding it with vinegar.

The best verdigrease is mostly manufactured at *Montpelier*, in France, by forming alternate strata of copper-plates, and the husks of grapes, during their vinous fermentation; when they speedily become acid, and corrode the copper: after the plates have stood in such situation for a sufficient time, they are moistened with water, and exposed to the air; the verdigrease being successively scraped off, as it collects on the surface. in this state, the acetite is called

fresh or *moist* verdigrease, having the form of paste; which after triturating it in proper troughs, is put in bags, and dried in the sun.

Crystals of Verdigrease are prepared by saturating vinegar with the common acetite of copper, and leaving the solution to clarify; after which it is poured into a kettle, where it is evaporated till a pellicle appear on the surface: when cool, the vessel is furnished with small sticks, on which the crystals gradually settle.

Verdigrease is chiefly consumed for striking a black colour, when combined with a decoction of logwood; but, as it is apt to corrode the texture of the cloth, the *Society for the Encouragement of Arts*, &c. in 1782, conferred their silver medal and ten guineas on Mr. CLEGG, for his discovery of a substitute for verdigrease, in dyeing *black*. He directs equal parts, by weight, of vitriol of copper and of pot-ash, or other strong alkaline salt, to be separately dissolved: the solutions are then to be gradually mixed; and, if the vitriol be saturated, the water on the surface will become transparent, on adding a few drops of the alkaline solution; in the contrary case, a blue colour will be produced; so that more ashes should be added, till a complete saturation be effected.... Mr. C. observes, that these proportions of vitriol and alkaline salt, will be equivalent to a similar quantity of verdigrease; and, on being combined with decoctions of logwood, they impart a fine black dye, which is not injurious to the texture of cloth, hats, or any other article that may be tinged of such colour.

Verdigrease is, in surgical cases, sometimes applied externally; it operates as a mild detergent in cleansing foul ulcers, or other open wounds. On account of its virulent properties, however, it ought not to be used as a medicine, without professional advice; and, in case any portion of this poisonous substance be accidentally swallowed, we refer to the remedies already pointed out, vol. i. p. 80.

VERDITER, a preparation of copper, which is occasionally used by painters as a *blue*, but more generally, in combination with a yellow pigment, or a green colour. It is obtained in the following manner: Let pure copper be dissolved in aqua-fortis; pulverized quick-lime be added to the solution; and the whole be well stirred. When the precipitate has subsided, it must be repeatedly washed in pure water; levigated while moist; and from 5 to 10 parts of quick-lime be incorporated with 100 parts of such precipitate: after which it is fit for use. See also vol. ii. p. 183.

VERJUICE, an acid liquor prepared from grapes or apples, that are unfit to be converted into wine or cyder. It is also made from crabs; which, after being laid in a heap to *sweat*, are next stamped or ground in a mill: the pulp is put into bags, and submitted to the action of a press, in order to obtain all the juice; which is then poured into barrels, where it undergoes a fermentation for 10 or 12 days; after which it is fit for the purpose.

Verjuice is principally used in sauces, ragouts, &c. though it sometimes forms an ingredient in medicinal compositions, especially in farriery; and is also employed by wax-chandlers, for purifying that substance. When intended for

sale, it is subject to the same duties as CYDER and PERRY.

VERMIFUGE. See WORMS.

VERMILLION. See vol. i. p. 183, and vol. ii. p. 181.

VERNAL-GRASS. See SPRING-GRASS.

VERVAIN, the COMMON, or SIMPLERS JOY, *vervena officinalis*, L. an indigenous plant, growing in waste places, on stone walls, and the sides of roads; flowering in the months of August and September. This plant is eaten by sheep, and its flowers are visited by bees. The roots impart a very agreeable taste to pickled cucumbers. Among the ancients, the Simplers Joy was dedicated to ISIS, the goddess of birth; and, though at present exploded in medicine, HOFFMAN asserts, that the most inveterate and violent head-ach may be cured, by filling a bag with the leaves of Vervain, in a dry state, and applying it around the throat of the patient.

[VESSEL, signifies, 1. Any thing in which liquids are put.

2. The containing parts of an animal body.

3. Any vehicle in which men or goods are carried on the water.

4. Any capacity. 5. Any thing containing.

In this place reference is had, only to the third explanation.

How to raise from the bottom of rivers, a vessel that has sunk: from *Montucla's edition of Ozanam's Recreations*, translated by Dr. HUTTON.

"This difficult enterprize has been several times accomplished, by means of a very simple hydrostatical principle, viz: that if a boat be loaded as much as possible and then unloaded, it tends to raise itself with a force equal to that of a volume of water which it displaced when loaded, and hence we are furnished with the means of employing very powerful forces to raise a vessel that has sunk.

The number of boats employed for this purpose, must be estimated according to the size of the vessel, and by considering that the vessel weighs, in water, no more than the excess of its weight over an equal volume of that fluid; unless the vessel is firmly bedded in the mud; for then she must be accounted of her full weight.

The boats being arranged in two rows, one on each side of the sunk vessel, the ends of cables, by means of *divers*, must be made fast to different parts of the vessel, so that there shall be four on each side for each boat. The ends of their cables which remain above water, are to be faftened to the head and stern of the boat for which they are intended. Thus, if there are four boats on each side, there must be thirty-two cables, being four for each boat.

When every thing is thus arranged, the boats are to be loaded as much as they will bear, without sinking, and the cables must be stretched as much as possible.... The boats are then to be unloaded, two and two, and if they raise the vessel, it is a sign that there is a sufficient number of them; but in raising the vessel, the cables affixed to the boats which remain loaded will become slack, and for this reason they must be again stretched as much as possible.

The rest of the boats are then to be unloaded, by shifting their lading into the former. The vessel will thus be raised a little more

and the cables of the loaded boats will become slack; these cables being again stretched, the lading of the latter boats must be shifted back into the others, which will raise the vessel still a little higher; and if this operation be repeated as long as necessary, she may be brought to the surface of the water, and conveyed into port or into dock.

An account of the manœuvres employed to raise, in this manner, the Tojo, a Spanish ship belonging to the Indian fleet, sunk in the harbour of Vigo, during the battle on the 10th of October, 1702, may be seen in the *Memoirs des Academiciens Estrangers*, vol. 2d. But as this vessel had remained more than 36 years in that state, it was imbedded in a bank of tenacious clay, so that it required incredible labour to detach it; and when brought to the surface of the water, it contained none of the valuable articles expected. It had been one of those unloaded by the Spaniards themselves, before they were sunk, to prevent them from falling into the hands of the English.

Additions by Dr. Hutton.

On the same principle is constructed the camel, a machine employed by the Dutch, for carrying vessels heavily laden over the sand banks in the Zuyder Zee. In that sea opposite to the mouth of the river Y, about 6 miles from the city of Amsterdam, there are two sand-banks, between which is a passage called the *Pampus*, sufficiently deep for small vessels, but not for those which are large and heavily laden. On this account ships which are outward bound, take in before the city, only a small part of their cargo, receiving the rest when they have got through the *Pampus*. And those that are homeward bound, must in a great measure unload before they enter it. For this reason the goods are put into lighters, and in these transported to the warehouse of the merchant, in the city; and the large vessels are then made fast to boats, by means of ropes, and in that manner towed through the passage to their stations.

Though measures were adopted so early as the middle of the 16th century, by forbidding ballast to be thrown into the *Pampus*, to prevent the farther accumulation of sand in this passage, that inconvenience increased so much, from other causes, as to occasion still greater obstruction to trade; and it at length became impossible for ships of war and others heavily laden to get through it. About the year 1672, no other remedy was known, than that of making fast to the bottoms of ships, large chests filled with water, which was afterwards pumped out, so that the ships were buoyed up, and rendered sufficiently light to pass the shallow. By this method which was attended with the utmost difficulty, the Dutch carried out their numerous fleet to sea in the above mentioned year. This plan however, gave rise soon after to the invention of the camel by which the labour was rendered easier.

The camel consists of two half ships, constructed in such manner, that they can be applied below water, on each side of a hull of a large vessel; on the deck of each part of the camel, are a great many horizontal windlasses, from which ropes proceed through apertures in the one half, and being carried under the keel of the vessel, enter similar apertures in the

other (half) from which they are conveyed to the windlasses on its deck. When they are to be used, as much water as may be necessary, is suffered to run into them: all the ropes are cast loose, the vessel is conducted between them, and large beams are placed horizontally through the port holes of the vessel, with their ends resting on the camel on each side. When the ropes are made fast, so that the ship is secured between the two parts of the camel, the water is pumped from them, by which means they rise, and raise the ship along with them. Each half of the camel is generally 127 feet in length: the breadth at one end is 22, and at the other 13. The hold is divided into several compartments, that the machine may be kept in equilibrio, while the water is flowing into it. An East-India ship that draws 15 feet of water, can, by the help of the camel, be made to draw only 11; and the heaviest ship of war, of 90 or 100 guns, can be so lightened as to pass without obstruction all the sand-banks of the Zuyder-Zee.

LEUPOLD, in his *Theatrum Machinarum*, says that the camel was invented by CORNELIUS MEYER, a Dutch engineer. But the Dutch writers almost unanimously ascribe this invention to a citizen of Amsterdam, called MECUVES MEINDERTSOON BAKKER. Some make the year of the invention to have been in 1688, and others 1690.... However this may be, we are assured on the testimony of BAKKER himself, written in 1692, and still preserved, that in the month of June, when the water was at its usual height, he conveyed in the course of 24 hours, by the help of the camel, a ship of war called the *Maagdvan Enkhusen*, which was 156 feet in length from *Enkhuysen hooft*, to a place where there was sufficient depth; and that this could have been done much sooner had not a perfect calm prevailed at the time. In the year 1693, he raised a ship called the *Unie*, six feet, by the help of this machine, and conducted her to a place of safety.

As ships built in the Newa, cannot be conveyed into harbour, on account of the sand-banks formed by the current of that river, camels are employed also by the Russians, to carry ships over these shoals; and they have them of various sizes. BERNOULLI saw one, each half of which was 217 feet in length, and 36 in breadth. Camels are used likewise at Venice*."

The *chevaux de frise*, which had been sunken in the river Delaware, below the city, to oppose the passage of the English ships, during the American war, were raised upon the above principles, after the peace.]

VETCH, or TARE, *Vicia*, L. a genus of plants comprehending 30 species, of which 8 or 9 are indigenous; and the following are the most remarkable, namely:

I. The *sylvatica*, or WOOD VETCH, grows in woods and hedges, especially in mountainous situations; where it flowers in July and August, attaining the height of from two to four feet.

II. The *Cracca*, or TUFTED VETCH, is frequent in shady places,

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* An engraving of the camel may be seen in, L'Art de batir les Vaisseaux; Amsterdam 1709, 4to. vol. ii. page 93.... See also the *Encyclopedia*, Paris edition, vol. iii. p. 67.

meadows, and fields; flowers in the months of July and August.... Both this, and the preceding species, are said to restore weak or starved cattle to their former strength, more speedily than any other vegetable hitherto discovered.

III. The *sepium*......See Bush Vetch.

IV. The *sativa*, Common Vetch, Fetch, or Tare, thrives in dry meadows, pastures, and corn-fields, where it flowers from April to June. This species is one of the most valuable of the Vetch kind, and is divided into three varieties, namely:

1. The *Summer Vetch*, is raised from seed, which is usually sown toward the end of March, or early in April, in the proportion of 8 or 10 pecks per acre, broad-cast*; though, when drilled, half that quantity is sufficient, and the crop will be greatly superior. This variety is chiefly propagated and used for weaning lambs and sheep, as well as for *soiling* horses and cows; its seeds afford an excellent food for pigeons.....Bees obtain a copious supply of honey from the young leaves of this plant, which are marked with black, and the spots of which contain a delicious saccharine juice.

2. The *Winter Vetch*, is sown in the month of September, in the same proportion as the preceding sort; a small quantity of beans, or (which is preferable) of black oats, being intermixed, to support the plants; which are generally covered with long dung, to preserve them from the frost. This variety is subservient to the same purposes as the Summer Vetch: when ploughed into chalk-lands in the month of May, it serves as an excellent manure for wheat intended to be sown in the succeeding autumn. In the county of Gloucester, the Winter Vetch is cultivated as pasturage for horses, and is eaten off so early, as to admit of turnips being raised in the same year.

3. The *Pebble Vetch*, is sown in the spring, but is seldom cultivated; because it is less hardy than either of the preceding varieties, and does not produce an equal quantity of fodder.

[The following paper on the benefit arising from the cultivation of vetches as a summer fallow crop, is by Mr. R. R. Livingston.]

"The introduction of a plant unknown to our soil and climate, and its relative value here, and in countries in which it has long been naturalized, is always important to agriculture, either as it presents the farmer a new object worthy his attention, or as it keeps him from entertaining false ideas of its value, and wasting his time and money upon one that will not repay his expense.

"Having observed that vetches, or as they are sometimes called, tares, were cultivated in Britain and in many other parts of Europe, either for seed or forage, I procured from England nine bushels, six of which are called spring, and three of winter vetches.

"1st May, 1794. Ploughed and cross-ploughed one acre of rye-stubble; the land, a light loam, inclining to sand, upon a sandy bottom, soil much worn out; the preceding crop was summer rye. After harrowing fine, I sowed three bushels of spring vetches. When they were up, spread six bushels of gypsum. About one-fifth part of the field was on a de-

clivity and very poor; here the crop was thin, yet low and short, the rest of the land was finely covered with a thick, close crop. The vines matted in each other, insomuch that the plants moulded at the bottom. When in full blossom they were cut, about the 20th August; they yielded two large waggon-loads of hay, which I compute at 25 cwt. The provender appeared to me remarkably succulent, and extremely well calculated for cows and sheep. Mine was applied to the use of the latter, but not having been at my farm since the winter set in, I can give no account of its application.

Second Experiment.

"Soil, a loose, slaty gravel, mixed with clay, being a dry hillock, containing one acre exclusive of some part in wood. In 1793, bore buckwheat; ploughed twice last April, and first of May sowed three bushels of vetches; strewed over them when they made their appearance, six bushels of gypsum. These were designed for seed, but the summer proving wet they continued growing all through the season, the seed at the bottom moulding and dropping out, while they blossomed at the top so that I could not tell when to cut them. They stood till October; when stretched out the plants were four and five feet long, but generally moulded below; when threshed I only got from them three pecks of seed of a very indifferent quality.

"Upon comparing these experiments with the usual increase in England, it appeared to me that the quantity of forage obtained was not inferior to what a similar soil would have produced there, and of course that our climate is not unfavourable to the culture, provided we can render them more productive of seed; which I can hardly doubt. My error was, I believe, in sowing them too thick, and manuring with gypsum, which makes every plant on which it operates, run to *haulm*. The wetness of the season also contributed to this evil, which may, I hope, be corrected by a little more experience and care.

"Upon this head, however, we are authorised to say little, but that this experiment has failed, so far as relates to the production of seed; but that the general health and vigour of the plant gives us reason to hope that future experiments may be more successful. If this should be the case, and we can with facility raise our own seed, (its common product in England being 25 to 30 bushels to the acre) this plant will be extremely useful to those farmers who want a competent proportion of meadow, and indeed in another point of view to every farmer.

"If cut for forage it comes sufficiently early to plough and sow wheat, for which I should think it the best of all preparations. The ground is so well covered that every weed is stifled: the air at the roots is stagnant, and the plant being of that succulent kind which feeds much upon the atmosphere, I think it cannot fail to add to the fertility of the soil. Mine appeared so mellow and free from weeds when the vetches came off, that I was tempted to sow the piece with lucerne, which looked very fine and promising when the winter set in.

"Our Indian corn comes off too late for wheat, it is therefore usual with us to fallow it with a

summer crop of oats and a small proportion of flax; this I believe to be bad husbandry, as the corn is an exhausting crop, so is oats, and in this way the ground is always growing worse, and as it is seldom rich enough to bear wheat after oats, we generally summer fallow for wheat, which is rendered by that means a very expensive crop. On the contrary, if we followed our corn with vetches, we should be able to put wheat in the same ground; and if clover is sown over the wheat in the spring, and permitted to continue only two years, and then followed by corn, the labour of farming will be diminished, and the fertility of the land increased by the double operation of these leguminous crops on the air, and in the quantity of manure that will be furnished by the additional stock they enable the farmer to keep. As this subject, so well understood in Europe, has hardly been attended to here, I will endeavour to state the profit and loss of two farmers, each cultivating (besides their meadows) one hundred acres of arable land, one in the usual mode of this country, and the other by the intervention of vetches and clover.

Common agriculture 100 acres.

Profit per acre.

20 acres of Indian corn, 35 bushels at 4*s*.	7	0	0
20 — Oats on corn ground of the preceding year, 20 bushels at 2*s*.	2	0	0
20 — Summer fallow,	0	0	0
20 — Wheat 10 bush. at 8*s*.	4	0	0
20 — Wheat stubble in pasture,	0	2	0
100 — Five years, yield per acre,	*L.* 13	2	0

Expenses per acre for five years.

Indian corn, ploughing, &c.	2	0	0
Oats, twice ploughed,	1	0	0
Harrowing, and seed, and sowing, and harvesting,	0	14	0
Summer fallow,	1	10	0
Wheat-seed and harvesting,	1	0	0
Rent on five acres at 4*s*. a year,	1	0	0
	L. 7	4	0
Balance of profit on one acre in five years, or on five acres in one year,	5	18	0
	L. 13	2	0

Profit on farming by intervention of Fallow Crops instead of Fallow.

20 acres Indian corn,	7	0	0
do. Vetches 25 cwt. at 2*s*. 6*d*.	3	2	6
do. Wheat 12 bushels,	4	16	0
do. Clover 25 cwt. at 2*s*. 6*d*.	3	2	6
do. Clover the same,	3	2	6
Five year's produce of one acre or one year's of five,	*L.* 21	3	6

Expenses.

Indian corn,	2	0	0
Ploughing corn-ground for vetches,	0	10	0
Seed three bushels, and sowing, &c.	0	12	0
Cutting and making hay,	0	8	0
Vetch stubble ploughed once for wheat, seed, and harvesting,	1	10	0
12 lb. clover-seed and sowing,	0	15	0
Mowing clover paid by the second crop,	0	0	0
Rent 20*s*. or 4*s*. a year,	1	0	0
	L. 6	15	0

Brought forward,		L. 6 15 0
To balance of profit per acre in five years or on five acres in one,		14 8 6
		L. 21 3 6

"Thus while one farmer makes 1*l.* 3*s.* 5*d.* a year per acre, upon his hundred acres, clear of expense, the other makes 2*l.* 17*s.* 5*d.*; the one gets little better than one hundred, while the other gets nearly 300 a year. In the above statement I have given one farmer credit for two bushels of wheat more than the other, since I am persuaded that the vetch crop will improve the ground more than the difference; as the dung given to the corn will not be exhausted by the intervention of an oat crop before the wheat is sown. To this profit should also be added the continued advance in the improvement of the crop by the one mode of husbandry, and the continued decrease by the exhausting the land in the other.

"The fallow farmer has no fodder which the rotation crop farmer does not possess, except the straw of his oats, which we will value at half a ton of hay per acre; he then has from his oats on

20 acres,	Tons	10 0 0
The fallow crop farmer from 20 acres vetches,		25 0 0
From 40 acres clover,		50 0 0
		75 0 0
Deduct oat straw,		10 0 0
Superiority to fallow crop farmer,	Tons	65 0 0

"He can thus winter at one ton a head, 65 head of cattle more than the fallowing farmer, and as each of these will afford at least six loads of dung, he will be able to carry out yearly 390 loads of dung more than the fallowing farmer; besides that he has one exhausting crop less. It will be easy to see what difference this must make in a few years in the produce of a farm, and how much more it would be than I have rated it at. We often ask with astonishment, how the British farmer can afford to pay a guinea an acre rent? The difficulty is solved if we examine the above statement; since the difference between fallowing and establishing a rotation of crops amounts to more than the difference of our rents and theirs; besides that, their produce must be reckoned at a higher price. I know there are some stiff soils on which it would be difficult to establish the rotation I mention; but this should be no argument against it where the soil will admit of it, particularly as clover and vetches may be introduced with a certainty of success, even if the ground should be naturally poor, by the addition of only four bushels of gypsum to the acre, which will indeed add 16*s.* a year to the accrueable expense; but it will at the same time, in all probability, add near a ton to the produce. I have gone into this digression for the benefit of farmers into whose hands our publications may fall, and who have not had an opportunity of examining the great improvements that have of late years been made in Britain, by the introduction of clover and fallow crops instead of fallow. I would not be understood to confine my observations to vetches, which have not yet been sufficiently tried in this country; potatoes, carrots,

or peas, sown thin, and cut green for provender, may all answer the purpose, but above all, clover. If this last is the only crop to be brought into the rotation, the system must be changed to the following course: 1st, Corn; 2d, Barley and Clover; 3d, Clover; 4th, Clover; 5th, Wheat on one ploughing; by this means a crop of clover will be substituted to a fallow. The wheat on a clover lay will require but one ploughing, and will follow two improving crops. The dung which will be applied to the corn, will serve to bring forward the crop of barley, or oats, if that should be preferred to barley; clover will do well with either.

"I have now in the ground one acre of winter vetches; this looked extremely well last December, but as I have not seen them since, I know not whether they will stand our winters; the result therefore of this experiment must make the subject of a future communication."....*Trans. New York Agricultural Society.*]

V. The *lathyroides*: Strangle Vetch, or Tare, abounds in dry pastures, gravel-pits and corn-fields, in chalky and sandy soils; where its small blueish-purple flowers appear in the month of May. Its culture should be encouraged in sloping grounds, and sandy hills exposed to the sun; as it affords the most tender and agreeable food to sheep.

Beside the different kinds above enumerated, there is another, called the *Chinese Vetch*, which was a few years since introduced into England: its culture is at present confined chiefly to the county of Glamorgan, where it grows in tufts, from 18 to 24 inches in height. This species promises to be very profitable to agriculturists; as it is said to yield four crops in the year, and to afford food excellent for cattle, both in a fresh state, and when made into hay.

VETCH, the Bitter, or Wood Peasling, *Orobus sylvaticus*, L. an indigenous perennial, growing in woods, hedges, and pastures, especially in mountainous situations; where it flowers from May to July. This hardy plant is chiefly cultivated in gardens, for the beauty of its numerous blossoms; either by sowing it in autumn, or by dividing the roots: the latter being very nutritious, are in Scotland applied to the same uses as those of the Heath Pea.....The leaves of the Bitter Vetch are much more relished by cattle, and especially by game.

VETCH, the Chickling, or Vetchling, *Lathyrus*, L. a genus of plants consisting of 13 species, 7 being indigenous; and the principal of these are:

1. The *Aphaca*, or Yellow Vetchling, grows in sandy corn-fields, and meadows, where its greenish-yellow-flowers appear from June to August. Dr. Withering remarks, that the leguminous fruit of this, as well as the other species of Vetchling, are very nutritious, and may be eaten either in broth, or be converted into *bread*; though a larger proportion of wheaten or rye-flower be required for such purpose.

2. The *sylvestris*. See Pea, the Narrow-leaved Everlasting.

3. The *pratensis*, Everlasting Tare, Common Yellow, or Meadow Vetchling, which abounds in pasture-lands, in woods, thickets, and hedges: it grows to the height of six feet; flowers in July and August. This species

is reputed to be an useful vegetable in the feeding of cattle; though Mr. SWAYNE remarks, that they seldom eat it, if there be a variety of other grasses in the same field; and, as it produces few seeds, which are mostly devoured by insects, it does not appear to merit attention. Nevertheless, BECHSTEIN observes, that the Yellow Vetchling, both in a fresh and dry state, affords excellent food for cattle in general, and therefore deserves to be cultivated in meadows.

4. The *latifolius*, BROAD-LEAVED VETCHLING, or EVERLASTING PEA, is frequent in woods and hedges; flowering in the months of July and August. It is often raised in gardens chiefly for the beauty of its variegated flowers; but Dr. ANDERSON believes it may be useful to the farmer; and, as it attains the height of 10 or 12 feet, having very strong stalks, he supposes that it would afford a large crop of hay.

There is an exotic species of the Chickling, namely, the *tuberosus*, which the Germans term Earth-nut, or Sow-bread; growing in stony and mountainous fields:.... this plant is a valuable addition to meadows; not only on account of its odoriferous flowers, which blow from May to July, and are eagerly frequented by bees; but also for its black tuberous roots, which are in Holland eaten as fruit, and boiled for culinary use; having the sweet and agreeable taste of nuts. These roots contain a larger proportion of mealy particles than potatoes: and BERGIUS extracted from one pound of Earth-nuts, three ounces of a beautiful starch: whereas the same quantity of the former yielded only one ounce. Why, therefore, should it not be used for *bread?*

VETCH, the CORN, WILD, or HAIRY TARE, TINE-TARE, or ROUGH-PODDED TARE, *Ervum hirsutum*, L. an indigenous plant, growing in sandy corn-fields, hedges, and meadows, where it flowers in the month of June. This vegetable is eaten by horses, cows, goats, and sheep; but it ought to be carefully eradicated; as, during wet seasons, whole crops of corn have been overpowered, and their growth completely stifled by this pernicious weed.

VINE, the COMMON, or *Vitis vinifera*, L. a native of Japan, and the warmer regions of Asia: it has for centuries been raised in Britain; though its culture is most successful in the temperate climates, or between the 30th and 50th degree of northern latitude.

There are numerous varieties of this valuable shrub, which are cultivated for the delicious grapes they afford. Without entering into an account of their respective periods of maturation, we shall simply state the names of the most remarkable sorts: point out such as are peculiarly serviceable; and conclude with an account of their culture.

1. The July grape, or *Morillon Noir Hatif*....2. The Royal Muscadine....3. The Malmsey Muscadine....4. The Black Muscadine.... 5. The White Muscat of Alexandria....6. The Red Muscat of Alexandria....7. The White Muscat of Lunel....8. The Black Muscadel.... 9. The Red Muscadel.....10. The Black Damascus....11. The Black Tripoli...12. The Black Spanish, or Alicant....13. The Black Lisbon.... 14. The Black Frontiniac, or *Mus-*

cat Noir...15. The Red Frontiniac, or *Muscat Rouge*....16. The White Frontiniac, or *Muscat Blanc*.... 17. The Grizzly Frontiniac....18. The Red Hamburgh.....19. The White Hamburgh...20. The White Morillon....21. The Early White Grape or Teneriffe....22. The Ciotat, or White Parsley-leaved Grape .....23. The White Corinth.....24. The Aleppo Grape....25. The Red Grape of Syracuse...26. The *Cœur*, or Morocco Grape...27. The Black Raisin....28. The White Raisin.... 29. The Malvoise, or Blue Tokay....30. The Genuine, or White Tokay.....31. The Lombardy..... 32. The Smyrna...33. The Brick... 34. The Claret....35. The Syrian Grape....36. The Auverna, or Genuine Burgundy....37. The Cat's Grape....38. The Greek Grape.... 39. The Black Corinth....40. The *Cornichon*...41. The Red Chaselas. ...42. The Black Prince...43. The Black Burgundy....And, 44. The White Early *Leipzig*.....See also vol. iv. p. 194.

To these may be added, the White, or Common Muscadine, having fine, round amber-coloured berries, and a rich vinous flavour. The White Sweet-water, which bears large white fruit, and abounds with an agreeable juice......The Small Black Cluster, produces oval berries, which have a pleasant saccharine taste.....The Large Black Cluster presents more bulky grapes than the preceding variety; but which, on account of their rough, harsh taste, are not edible in a fresh state, and therefore chiefly converted into *Port-wine*...The Miller Grape, or New Muscat of Jerusalem, yields large round, red fruit; which, in prosperous seasons, attains nearly the size of goose-berries....The Black Hamburgh produces fine clusters of oval, black berries, that possess a sweet, vinous flavour....All these varieties are recommended by horticulturists, as being eminently adapted to *small* gardens....It is a remarkable historical fact, that, a few centuries since, the extensive *Vale of Gloucester* was industriously planted with this delightful shrub; from the grapes of which, England was then chiefly supplied with excellent native wines.

The vine is generally propagated from seed, cuttings, or layers; though it is sometimes raised by ENGRAFTING, or INOCULATION.... In the first case, the seed should be set toward the end of February, or early in March, in pots containing light rich mould; and be plunged in hot-beds of a moderate heat. During warm weather, they ought to be gently watered in the afternoon, when the frames should be carefully closed. About the end of August, the young plants are to be gradually exposed to the air, so that they may become hardened before the approach of winter; but in the latter season, they must be sheltered by frames, covered with mats. After having attained the height of about six inches, it will be proper to remove them into larger pots, filled with similar soil; to immerse them again in the hot-bed; and to tie them to slender sticks, or rods, in order to prevent them from trailing. Towards the end of the succeeding March, or in the beginning of April, they may be planted against the wall, at which they are intended to remain. In this situation, Mr. FORSYTH directs them to be cut at the *third eye*, if they be vigorous; but, in the contrary case, at the *second:* the lower bud,

however, must be rubbed off, as soon as it appears.

If vines are designed to be raised from *cuttings*, these ought to be selected from strong and full grown shoots, which should be cut perfectly smooth, immediately beneath the part where they were produced, and have one or two joints of the last year's wood. The cuttings must be planted against walls, at the distance of one foot from each other, and at such depth, that the second eye may be level with the ground; but the lower eye ought to be rubbed off, on its first appearance; because, if that operation be delayed, the upper eye will be injured in removing the former. *Runners* and lateral shoots should likewise be cut off, excepting two which are to be trained against the wall.

Vines may also be propagated by *layers*. For this purpose, let the most vigorous shoots be laid in pots filled with fresh mould, and placed about two inches beneath the surface of the ground; the incision being made in the old wood below a joint, so as to leave one or two eyes on each. When the shoots or layers have taken root, they must be separated from the parent stock; manured with rotten dung or leaves; and watered twice a week during dry summers: all lateral excrescences should also be picked off, and the layers treated in the same manner as the cuttings. During the first year, vines will not advance rapidly; but, in the second, the strongest may be easily distinguished, and these may be suffered to stand, while the weaker ones must be transplanted to other situations.

The quality and size of grapes depend greatly on the strength of the plant on which they grow..... Mr. Forsyth, therefore, recommends the vines to be cut down to two or three eyes, in the first year, if there be a superfluity of naked wood. In the following year, a considerable increase of fine wood will be obtained, when all runners, &c. must be picked off; and the main shoots be nailed to the wall, progressively as they increase in length. During fine weather, it will be advisable to examine them every second or third week, and speedily to remove every lateral shoot. No farther attention will be required, excepting that all weeds must be carefully eradicated; for otherwise the growth of the vines would be impeded. In the month of February, in the second year, the pruning should be repeated; and three buds be left to each of the strongest main shoots; but in those of a weaker growth, two eyes only must be permitted to remain. Mr. F. observes, that his *composition* ought to be applied as early as possible, after each pruning; for the vine, being very porous, speedily imbibes moisture, and thus quickly decays: should it accidentally have been cut at a late season, it will be necessary to sprinkle the powder of the preparation before quoted over the wound, till the bleeding or flow of the sap be completely checked.

Numerous insects prey upon the vine; which, unless timely destroyed, will totally kill the plant: as we have already stated the best methods of exterminating them, in the articles Hot-house, Insects, Red Spider, Pine Apple, &c. we shall here only remark, that their depredations may, in a great measure, be prevented

by watering the vines, three times in the week; a simple expedient by which the luxuriance of this shrub, as well as the *swelling* of its fruit, will be greatly promoted.

When the clusters are very large, and the grapes begin to ripen, it will be useful to cover them with nets; or with *buntine*, a stuff that serves for the flags of ships; and which will not exclude the sun and air from the fruit, while the latter is protected from the ravages of birds. The leaves, however, should only be plucked off in small portions, as often as the grapes are gathered; by which method these will continue in succession for a much longer period than could be effected, by hastily removing all the foliage from their branches. Those readers, who are desirous to obtain farther information, relative to the raising of grapes, will consult Mr. SPEECHLEY's "*Treatise on the Culture of the Vine*," 4to.; and Mr. FORSYTH's *Treatise on the Culture and Management of Fruit-trees*," &c. in which the subject is amply discussed.

Vines are chiefly valued on account of their delicious GRAPES; but they may be made subservient to many other useful purposes: thus, the young twigs, when dried, cut into small pieces, and moistened with water, afford a wholesome food for cattle, and particularly for horses. Dr. DARWIN conjectures, that the leaves of the variety, which produces purple grapes, would impart a colour, and astringency of taste, to British wines, similar to those derived from the skin of the same grape, in foreign vinous liquors...The wood of vines reduced to charcoal, affords (according to JACOBI, a reputable German writer) an excellent blue colour for painting and drawing. He employed equal quantities of fixed vegetable alkali, and vine-coal: after melting the former in a crucible, he gradually introduced the latter; both were allowed to act on each other, till the ebulition ceased; when the compound was poured out, dissolved in rain-water, and precipitated with spirit of vitriol: in consequence of which the ley, and especially the sediment assumed a deep blue cast. After edulcorating this powder, by repeated washings in fresh water, and then calcining it, he obtained a very bright and pleasing blue pigment, which acquired a dark blackish hue, on dissolving it in oil of vitriol; though its lustre and shade, were instantly re-produced, on diluting the solution with pure water....Lastly, we learn from BINDER, another German author, that the purified stones or seeds of grapes, when moderately roasted, and ground in a coffee-mill, serve as a good substitute for *chocolate;* which, on the proper addition of sugar, cinnamon, and a little VANILLA, is very grateful to the palate, and cannot be readily distinguished from the genuine sort prepared of cacao.

[The article VINE is preserved entire; as some useful hints may be derived from it, though the directions refer chiefly to the cultivation of the vines in a hot-house.....We shall now describe,

1. The *species* and varieties of North America.

2. The most approved culture of vines in the United States.

3. The art of making wine.

Description of the species and varieties of Vines in North America.

The following very interesting

paper on the vines of the United States, was drawn up last spring, by Mr. WM. BARTRAM, at the request of the Editor. The insertion of it in the present work, is necessary to enable the reader to speak with certainty as to the species which may be cultivated, or met with, and thus prevent that confusion which the want of a true classification of our vines has hitherto produced.

"The most obvious characters which distinguish the grape-vines of America from those of the old continent, are, 1. The berries of all the American species and varieties that I have seen, approach the figure of an oblate spheroid; that is, the poles are flattened, and the transverse diameter is longer than the polar: however, I have observed that Alexander's grape, and some of the *bul* or bullet grapes, approach nearer to an oval or elipsis, which is the figure of all foreign or European grapes that I have seen; viz. a prolate spheroid....2. Most of the American species and varieties have a glaucous and yellowish pubescence on the under surface of their leaves ....3. All that I have observed in the northern and eastern districts of the United States are *polygamous*; i. e. those vines which bear fruit (female) have hermaphrodite flowers (pentandria monogynia); but the males have only five stamina, without any female organ, and are always barren. One should suppose, from WALTER so strongly marking this character as to induce him to place Vitis in the class *Dioecia*, when LINNÆUS and the other European botanists had placed it in Pentandria (he himself being an European), that all the grape-vines of the old continent are hermaphroditous and Pentandrian. I know not, from my own observation, whether the bull-grape of Carolina is hermaphroditous or dioecious, and therefore rest satisfied with WALTER's assertion.

"With regard to the vine of America, I find a great difficulty in discriminating the species from varieties or hybrids, which, perhaps, may be partly accounted for from some of our vines being dioecious, and there being a much greater number of male vines than of fruit-bearing ones, whose *farina fecundans*, mixing with the air and winds, is carried to a great distance to the female organs of hermaphrodite flowers. I shall now give my opinion of the distinct species or established races from which all the varieties or mules have originated.

"1st. The COMMON BLUE GRAPE, or BUNCH GRAPE, *Vitis sylvestris*, or *V. occidentalis*. This is the most common grape. The acini or berries are of the oblate figure, of various sizes on different plants, and of as various tastes. ....Some are sweet and pleasant enough, having a musky flavour. They are nearly as large as the Burgundy grape; are black when ripe, having a glaucous bloom, like the damascene plum. The leaves of this species are large; their under surfaces covered with a clay-coloured down or pubescence. They are tri-lobed, each lobe subdivided or dentated. Some varieties have very deep sinuosities, almost touching the mid-rib.

"2d. FOX-GRAPE, *Vitis vulpina* of Bartram, *V. foliis cordatis subtrilobis, dentatis; subtus tomentosis*, Linn. *Spec. plant. V. vulpina dicta Virginiana alba; Pluckn. alm.* 392.

Vitis vulpina dicta acinis peramplis purpureis in racemo paucis, sapore fœtido et ingrato præditis, cute crassa carnosa Clayt. n. 696. The last part of the description is decisive; every word true when applied to our fox-grape of Pennsylvania; and Dr. CLAYTON's authority should be relied on, as he was a native of Virginia, spent his life there, and was an excellent botanist. The leaves of the fox-grape are large and lobated, not much unlike those of the common bunch grape, but not so deeply sinuated and toothed; their under surface thickly covered with a yellow pubescence or down; the fruit bunches short, having few acini or berries on them, but these few are large, and of an oblate figure. Some are as large as a musket-ball, and are of different sizes and colours; black, red, purple, green and white, when ripe. All possess a strong rancid smell and taste, have a thick coriacious skin, and a tough jelly-like pulp or tegument which encloses the seeds. Between this nucleus and the skin is a sweet lively juice, but a little acerb or stinging to the mouth if pressed hard in eating them. There is another property of this grape which alone is sufficient to prove it to be the *Vit. vulpina*, that is, the strong rancid smell of its ripe fruit, very like the effluvia arising from the body of the fox, which gave rise to the specific name of this vine, and not, as many have imagined, from its being the favourite food of the animal; for the fox (at least the American species) seldom eats grapes or other fruit if he can get animal food.

"The vines, though they make vigorous and extensive shoots, never mount high, but ramble over shrubs and low trees to a great distance from the original root. This appears to be the *V. taurina* of WALTER, and the *labrusca* of LINNÆUS.

"3d. BULL-GRAPE, *Vitis taurina* of BARTRAM, *Vit. vulpina* of LINNÆUS and WALTER. This excellent grape is called by the inhabitants of Georgia, Carolina and Florida, *Bull-grape*.* The preceding species is called *fox-grape* from Pennsylvania to Florida. The bull-grape has a stiff, ligneous, smooth stem, of pale ash-colour, and mounts to a great height by climbing up trees. The leaves are cordated and serrated, thin, and both surfaces naked or smooth. The racimes or fruit bunches short, containing 15 or 20 grapes at a medium. The berries or *acini* are large, near the size of a rifle-ball; of a black colour when ripe; having a blueish nebule over them, which being rubbed off, they appear of a deep blood-colour. In figure they approach to an ellipsis or prolate spheroid: however, at a little distance they appear black and round. This species is deservedly esteemed the best native grape in America, and would make a rich and delicious wine. The juice is sweet, rich, and lively, and there is but little of the tough jelly-like substance enclosing the seed. The skin of the grape is rather thick, yet there is a sweet melting pulp within, which mixes with the saccharine juice when eaten.

* Mr. BARTRAM lately informed me, that the word bull is an abbreviation of bullet; the grapes being so called from their approaching the size of a bullet. The name "*taurina*" is, therefore, not the most proper.

This undoubtedly is the first American grape which merits attention and cultivation for wine. It thrives in every soil and situation from the sea-coast to the mountains; it even thrives and is fruitful when growing in the barren sand-hills of Carolina and Florida.

" 4th. WINTER-GRAPE, *Vitis serotina*. Cotyledon palmated. This is a vine remarkable for its sweet flowers. It mounts to the top of high trees; the stems and twigs more hard and ligneous than the bunch grape, to which I think it approaches the nearest. The leaves are small, cordated, smooth, thin and serrated. The fruit bunches branched, but the berries small and black, not so large as currents: the fruit not ripe till late in the autumn, and the juice extremely sour and ill-tasted, so that even birds will not eat them till winter frosts have meliorated them.

" I shall now mention the varieties that appear to me to have arisen from a commixture of the several species or races.

" *Alexander's* or *Tasker's grape* is a large grape, black or blue, the size of the fruit of the *Vit. vinifera* of the old continent. The grapes approach to the elliptical figure. They are, when fully ripe, perfectly black, and as sweet as any grape. Many persons think them too luscious. Before they are quite ripe, some think they possess a little of the stingy taste of the fox-grape, but my taste never could discover it. It has been supposed to be a hybrid between *Vit. sylvestris* (common bunch grape) and *Vit. vinifera*, because it was found on the rocky hills near the river Schuylkill, above the upper ferry, in the neighbourhood of an old vineyard of European grapes; but I believe it to be an American.

" *Bland's grape*. This is an excellent grape. The bunches large, branched, and well shaped, six or eight inches in length. The berries large, about the size of the common white grape of Europe, and round or oblate; when perfectly ripe, of a dark purple or red wine colour; the juice sweet and lively, having a little musky flavour, with a small portion of an agreeable astringency, somewhat like our best bunch or wild grapes, though much sweeter than any of them. If this grape is what I take it to be, a genuine American, it is a hybrid or variety. It was found in Virginia, where it is called the Virginia muskadell, and sent to me by the late Col. BLAND. This excellent grape bids fairest, next to the bull-grape, to afford a good wine.

" There seems to be no end to the varieties of *Vit. sylvestris*, or *bunch grape*, in size and taste of the fruit, as also in the leaves. There is a middle-sized round grape, called *Raccoon-grape*, which appears to be much of the nature of the fox-grape: they are black when ripe; have much of the stingy taste and rancid smell of the fox-grape, and the tough jelly pulp that envelopes the seed; the skin thick; but they are not more than half the size of the fox-grape.

" Thus it appears to me that we have in the United States, four species of *Vitis* or grape vines, viz.

1. *Vitis sylvestris*, or *Vit. Americana*, or *occidentalis*, common bunch grape.
2. *V. vulpina*, fox-grape.
3. *V. taurina*, bullet-grape.
4. *V. serotina*, winter-grape, by

some called Bermudian grape, and innumerable varieties and hybrids.

By varieties I mean different sorts of an individual species, and by hybrids, spurious offspring by intermixture of species. Of the latter sort are,

1. Alexander's, or Tasker's grape.
2. Bland's grape.
3. Raccoon-grape."

The variety of vines which cover every part of the American continent, and the success which has attended the attempts to cultivate foreign and native grapes upon the large scale, by Colonel TASKER in Maryland; by the Hon. Mr. ANTIL in Monmouth county, New Jersey; by Dr. HOWARD, near New Brunswick; and by Mr. ALEXANDER on the Schuylkill, long before the American revolution, is sufficient to prove that our climate is perfectly congenial to the cultivation of the vine. But the recent experiments of Mr. LEGAUX at Springmill, though made, according to his own account, in a situation, and under circumstances not the most favourable for success, leave no room to doubt, that there is as much chance of good crops of grapes, as of any other fruit cultivated among us, and that even the number of bad years in the United States, are fewer than in those parts of the continent of Europe, where the vine is accounted a staple; that violent rains, excessively high winds, and hail storms, which so often blast the grapes of the European vigneron, rarely occurs here, and finally that those still more destructive insects, *Gribouri* and Beche, are *unknown* in the United States. With a knowledge of these advantages why should we any longer import *grapes* from Portugal or Spain, or wine from any country? The luxurious inhabitants of our seaports, will probably long be averse from encouraging the cultivation of vines; but the inhabitants beyond our mountains, are guilty of unpardonable extravagance, in paying 15*s*. for a quart of wretched Sherry, Lisbon, or Teneriffe wine, when they might drink their own wine at one-fourth the expence, and this too, without the loss of a moment's attention to their *proud articles*, *wheat* and *mayz*. For their benefit principally, the Editor has taken much pains to condense the most valuable information within his power, on the subject of cultivating the vine, and the making of wine; and will be happy in hearing the result of any experiments which his readers may make, tending to render the processes more easy or certain.

1. On the vine considered in regard to climate, soil, exposure, seasons, culture, &c. *Cours D'Agric. tom.* x.

" Soil, climate, exposure, cultivation, ought to be appropriated to the inflexible nature of vines; and the least violation of this natural character, essentially alters the product. The plants of Burgundy transported to the south, no longer produce wines so agreeable and delicate.

2. Soil.....If we could judge of the quality of the vine by the vigour of its vegetation, it is in fat, moist soil, well dunged, that it ought to be cultivated. But we are taught by experience that the goodness of wine is *never proportioned to the force of the vine.....*

Clayey (or argillaceous) soils are improper for vines; but a calcareous soil (chalky, limestone) is in general proper, being dry and light, affords a proper support to the plant; the water with which it becomes impregnated, circulates and freely penetrates through the whole stratum; the numerous ramifications of the roots imbibe it at every pore, and the wines produced are spirituous. Soils light and pebbly are also favourable.

Volcanic earth, also produces delicious wines. The best wines are produced among the remains of volcanoes. The wines of Tokay and the best wines of Italy are the productions of volcanic soil."

An anonymous writer in the 33d vol. of YOUNG's *Annals of Agriculture*, who appears to be well instructed on the subject, says,

"The lands best suited to the cultivation of vines in America, are situated in a latitude somewhat lower than in Europe. There is strong reason to believe that wines similar to those made in the neighbourhood of Bourdeaux, called *Vin de Medoc*, *Vin de Grave*, red and white, might be produced in Pennsylvania, Maryland, and Virginia. Some parts of Pennsylvania, some lands three or four miles from the banks of the Susquehanah, and of the Potowmack; those which lie between the Susquehanah and Baltimore; those which lie on the road from Baltimore to Alexandria, appear in their nature, in their declivity, in their aspect, in their degree of elevation, and in the sorts of oaks and plants they produce, to resemble the environs of Bourdeaux..... Those lands consist of a mixture of sand, gravel, *quartz*,* in pebbles generally white, sometimes of various colours, about the size of an egg, more or less, mixed with some flinty, and some calcareous ones, and also of a small quantity of *black vegetable earth*, which is found on the surface, and appears formed by the *dead leaves of vegetables*. Those lands, though not much elevated, are free from all sediment of water, and their declivity is gentle.

"The land should be at the distance of about a mile from any woods; the greater distance, the better the vine will succeed. In the forests of Virginia, the author of this treatise has eaten, in the middle of September, between Baltimore and Alexandria, black grapes of small size, very sweet and ripe, similar to those from which the *Vin de Medoc* or claret is made †. They had been gathered in the middle of the woods, and there is reason to believe, that with proper cultivation, this species of wild grapes might be improved so as to make excellent wine."....

"Stiff ground, says Mr. ANTIL,‡ may be mended by sand, ashes, soot, the rubbish and mortar of old buildings, dust of coal kilns, gravel, fowls' and sheep's dung, or the *old* dung of neat cattle. Worn out ground may be renewed by fresh mould, creek mud, and deep ploughing."

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* Quartz consists of flint and clay, and a little lime.....*Edit.*

† Will any of the readers of this work, in the vicinity of the above mentioned grapes, ascertain by means of Mr. BARTRAM's description, the kind of grapes alluded to, and communicate with the Editor?

‡ Trans. Amer, Phil. Soc. vol. i.

"3. Exposure.....The same climate, the same cultivation, and the same soil, often furnish wines of very different qualities. The summit, the middle, and the bottom of a hill give productions very different. On the top, the temperature is variable and cold, the grapes less abundant, and mature with difficulty, and the wine arising from them, is of an inferior quality to that furnished by the sides of the hill. The bottom of the hill produces vines of great vigour, but the grapes are never so saccharine or agreeable as those which grow towards the middle region."

European writers constantly recommend an eastern or southern exposure for the vine. Mr. ANTIL of New Jersey, also advises a S. and S. E. aspect; but Mr. LEGAUX of Springmill, finds an eastern exposure unfavourable, and the Editor saw at Mr. NOTNAGEL's little vineyard, near Bristol, that more grapes were blasted in 1802, in the parts looking to the east, than in any other exposure. In Pennsylvania, a northern exposure is preferable, because it keeps back vegetation in the spring, and thus saves the vines from late frosts.

"4. Seasons.....The vine is fond of warmth, and the grapes never come to perfection but in dry soil, exposed to the rays of an ardent sun. Rains which fall when the grapes are increasing in size, are favourable, they assist the organization of the vegetable; and furnish it with its principal nutrition. Winds are always prejudicial to the vine. The farmers, therefore, carefully avoid situations exposed to wind; they prefer calm situations, well sheltered, where the plants may be exposed only to the benign influence of the luminary towards which they are placed.

Fogs are destructive to the blossoms, and do essential hurt to the grapes.

5. Culture.....The culture of the vine has its rules as well as its boundaries. The soil where it grows must be often dug up; *but it refuses the manure necessary for other plantations.* All those causes which powerfully concur to give activity to the vegetation of the vine, alter the quality of the grapes. The culture ought to be directed in such a manner that the plant may receive only poor nourishment. Dunging is forbidden at Gaillac, for fear of lessening the reputation of the white wine."

"The first step to be taken, says ANTIL, is to provide a stock of vine cuttings, not only enough to plant the vineyard, but a small nursery too. If these cannot be had all at once, begin to lay up a year or two beforehand, and plant them in your nursery in even rows, at four inches distance, and the rows three feet asunder, that they may be howed and kept clean; and scatter some short straw and chaff along between the rows to keep the ground moist and the weeds down. The reason of planting the cuttings so close in the nursery is, to prevent their shooting their roots too far into the ground. which would render them very difficult to take up without damaging the root, and more tedious to plant out.

"Do not plant various sorts of vines in your vineyard, if you mean to make good wine. The most experienced vignerons say, that grapes of one sort make the best wine: that if they are mix-

ed, they hurt the wine, by keeping it constantly upon the fret, by means of their different fermentations. If my vineyard contained one acre of ground, I should chuse to have but two sorts of grapes in it, if I meant to make a profit of it by selling the wine; if it contained two acres, I would have four sorts in it; and if it contained three or four acres, I should not chuse more. But if it contained six, eight or ten acres, perhaps I might incline to have a greater variety; but then I should prefer those kinds that make the best wines and such as do not come in at the same time, from whence I should reap many advantages.

" The next thing to be considered is the quality of the vines to be made choice of. This must be limited, and adapted to the climate, where the Vineyard is planted. The most hardy and the earliest ripe, will best suit the most northern states, I mean those of New-Hampshire, Boston, Rhode-Island and Connecticut. The vines proper for these countries are.

1. The black Auvernat,
2. The black Orleans,
3. The blue Cluster,
4. The Miller Grape,

The black Hamburgh,
The red Hamburgh,
The white Muscadine,
The Muscadella,
The Melie Blanc,
The white Morillon,
The white Auvernat,
The grey Auvernat,

These first 4 numbered make the best Burgundy.

" All these are ripe early in September.

" All the foregoing sorts will do very well for New-York, New-Jersey, Pensylvania, and Delaware. I mean for the clear and open parts of these countries; to which may be added the following sorts, which I recommend by way of trial, they being more tender, but ripen in September; they should have the warmest birth in the vineyard.

The Chasselas Blanc, called the Royal Muscadine,
The Malvois or Malmsey,
The grey Frontiniac,
The red Frontiniac,
The black Lisbon,
The white Lisbon,
The Chasselas Noir.

All the foregoing sorts will do very well for the states of Maryland, Virginia and North-Carolina, to which I shall add the following sorts, and recommend them for trial, but then they must have a warm place.

The white Frontiniac,
The malmsey Muscat,
The claret Grape of Bordeaux,
The white Oporto,
The black Oporto,
The black Damask,
The Chicanti of Italy, which makes a rich wine much admired in Italy.

All the above-mentioned sorts will do well in South-Carolina, and in the country still farther south. To which I shall add the following sorts, as being still more tender and later ripe.

The raisin Muscat,
The Alicant and Malaga Raisin Grape,
The red Muscat of Alexandria,
The white Muscat of Alexandria,
The gros Noir of Spain,
The St. Peter's Grape."

The anonymous writer in the 33d volume of ARTHUR YOUNG's annals before-mentioned, recom-

mends "to procure cuttings of the vine, called in Medoc *carmenet*, and in *Les graves de Bordeaux*, *petite vigne dure*; or otherwise cuttings of grand carmenet, *carbonet*, or *grande vigne dure*, three different names given to the same species, in the vineyards of different parishes in the environs of Bordeaux. The sprouts should be three feet long, cut in November or December; and bound together in bundles of one foot diameter. The extremities of these bundles must be closed, where the branch has been cut from the vine, with clay three or four inches thick, and the whole must be wrapped up carefully in mats or coarse cloth, and may be packed in the hold of a ship, and arrive in February." From the experience, however, of the editor and his friends who have found much difficulty in naturalizing foreign vines, he recommends the cultivation of the native grapes of the United States, particularly the *vitis sylvestris*, or small blue or bunch grape; Bland's, Tasker's or Alexander's, and the bull-grape of Carolina and Georgia.

"In many parts of Virgina, North and South-Carolina, and in Georgia, the soil is chiefly a hot dry sand, and what strength nature afforded, has been exhausted by tobacco, Indian corn, rice, &c. However these grounds, where they lie near to rivers and creeks, may easily be recruited; for these rivers abound with rich mud, which is the best kind of manure for such lands, and it would be no great expence to procure a sufficient quantity of it to cover a piece of ground large enough for a vineyard, especially if it be considered, what a number of hands the gentlemen of these countries have, who might be employed at such times, when other business is not very urgent: But then this mud must lie some time upon the ground, before it be mixed with the soil, at least a summer and a winter; for at first it will bake very hard, and be very crude; but the winds, dews, rains and frosts, with the help of the sun, will soften, mellow, and bring it into proper temper. Then it must be equally spread and well mixed with the soil. Thus may the land be recruited, and kept in good heart, from time to time, and from a barren useless piece of ground, it may become profitable both to the owner and his country.

The nature and quality of the vines being considered and made choice of, the next thing to be known is, how to make choice of cuttings to plant. Avoid all branches that have not borne fruit, all suckers, nephews, lateral and secondary branches, and especially the long running barren branches. These different sorts seldom produce fruitful vines. Choose the cuttings from the teeming part of the vine, from among those branches that were set apart for bearing fruit; and among these, choose such as are *short jointed*, and have been most fruitful the last summer; let them be cut down close to the old wood. The upper part of the same branch is less ripe, and more loose and spungy, and more apt to fail, and very seldom makes so firm and lasting a vine. These branches must be trimmed and cleared from the nephews and the lateral or secondary branches; great care must be taken not to wound the buds or eyes, which a careless hand is very apt to do. If the bud be bruised with the back of the knife, so that the cotton, that

lies under the thin bark, that covers the bud, and is wisely intended to preserve it from the injuries of the weather, be rubbed off, the bud will perish. Therefore as the buds lie close to these lateral branches, and are in so much danger of being wounded, it is best and safest to cut the branches off, a little above the height of the bud, that the little stump or stub left behind may be above the top of the bud, so shall the eye be left secure.

"These branches being thus trimmed, remain whole and at full length till the next April*, which in the northern states is the best time for planting. They should be separated from the mother plant, sometime in *September*, or as soon as the vintage is over, that being the best time for the trimming of vines; because the wounds which the mothers receive are healed up, and securely closed from the severity of the winter season. If this work be left till February or March, the parent suffers by her fresh wounds in long rains, sleets and frosts that follow; or if the weather be favourable, she grows faint and exhausted by excess of bleeding, and her eyes are drowned in her own blood.

"The best way I have found for preserving the cuttings through the winter, is as follows. At or near the north-west corner of your vineyard or garden, the fence being good and close, let a small trench be dug five or six inches deep and wide, and so long as may contain all your branches. In this, plant them thick and close with the but ends down, and fill up the trench, as you go, with the ground, that came out of it, and press it down well with your hand, all about the bottom of your branches; let the dirt rise two or three inches above the surface of the ground, to prevent the water from settling about the vines, which would rot them. Between every sort, drive down two stakes and fix a label to one of them, to distinguish the vines from each other, by their proper names. Before you plant your vines in this manner, drive down two or more crotches, according to the quantity of vines, at about three feet from the trench, and parallel with it, upon which poles are laid, to support the upper part of the branches about twelve or fifteen inches from the ground.... Thus they all lie sloping without touching the ground, which preserves them from growing mouldy and from rotting. The vines then are to be covered with straw, laid lengthways upon them, up and down a little beyond the trench, so that the water is carried off beyond the foot of the vines by this straw roof; and yet the straw must not be laid on too thick, least it continue moist too long, and occasion mouldiness. Across the top, a pole is laid, and across the bottom, and fastened down to prevent the straw from blowing away..... Thus they remain 'till spring.

In the beginning of April when you are ready for planting, the weather being moderate and calm, the frost out of the ground, and nature teeming with fresh vegetation, then cut your branches for planting. If one cutting from

* Mr. Legaux recommends the autumn to plant vines, but many in Pennsylvania, who have successfully cultivated them, adhere to the spring, and plant early in March. *Editor*.

every branch be sufficient for your purpose, then cut the lower part about twelve or fourteen inches long. But as it is most likely, that you will not be so lucky, as to have enough of these, then do what necessity requires, and make two or three cuttings of every branch, not less than a foot long; and having a trench made ready, place them in it close together, the but or lower end down, and cover them up with earth to the upper eye, 'till you are ready to plant, carefully placing every sort by themselves, with a label denoting the kind. This direction is calculated for the three [or middle bread states]. The more northern states will be a month later, and the more southern states will be at least a month, some two months earlier; they must conduct themselves accordingly. To these last states, I would recommend the cuttings to be longer, that they may be planted deeper, the better to preserve the vines from excessive heats and droughts.

"Your ground as I said before, being well manured and brought into good heart if old, or being naturally rich if new, and having been, at least twice, deep ploughed and well harrowed the summer before, in the fall of the year it must be deep ploughed the third time, and always across the hill or rising ground, and let it lie rough just as it is ploughed, all winter, which will greatly prevent washing, and the frosts will mellow it and prepare it the better for vegetation.

"In the spring of the year, as soon as the ground is dry, let it be well harrowed both ways, with a sharp iron tooth harrow and laid down smooth and even; and take this caution along with you, which I now give once for all, *never to meddle with the ground of your vineyard when it is wet*, or even moist at top, nay, I would have you avoid as much as possible, walking in it at such a time. Your own experience will soon teach you the reason of this caution. For you will find that, the lighter and more open and loose the soil of a vineyard is kept, the more the vines will flourish, and the more fruitful they will prove.

"When your ground is in proper order, provide a small stake of four feet long for every vine; and begin to lay out your vineyard in the most regular manner the nature and shape of the ground will admit of. If you mean to plough and harrow your vineyard, with a small single horse plough, and a small corn harrow, you must leave a border of 10 or 12 feet on each side of every square, to turn your horse upon, lest he trample upon and destroys the outside vines.... There will be no need of such borders along the upper or lower side of the squares, unless you chuse it for regularity's sake; because your vineyard should never be ploughed up and down hill, but transversely, unless you mean to have it gullied, and the rich soil washed away by hard rains.

"The following method of laying out a vineyard, I think is as easy, as regular and as expeditious as any, for a long square or a four square piece of ground. Your squares being laid out, and having concluded how far your vines shall stand every way from one another, in which every man is to please himself; stretch a line of a proper length, and stitch small pieces of red, blue, green, or any other co-

loured cloth at such distance from each other as you mean to plant your vines. I will suppose eight feet*, because upon the most mature deliberation, I think that the best distance for vines to stand at in this country, as I shall afterwards show more fully.

"The line being ready, stretch it along the head or upper part of your square, so that a rag appears at each corner. Then drive down a stake at every rag: This done, move your line down to the lower side of the square, which is opposite to the first, and stretch your line along that, having a rag at each corner, and drive down a stake at every rag: then turn your line the other way, up and down, and fasten it to the upper, and to the lower outside stakes, so that a rag be at each stake, and drive down a stake at every rag, and so go on from stake to stake, till the whole be completed. If you have been careful not to disturb or move the line, when you drove down the stakes, and have driven them all on the same side of the line, your square will be uniform, and the stakes near the ground, will range exactly every way.

"If your vineyard be large enough to divide into four, six, eight squares, or more, according to the different sorts of grapes you design to have in it, and you are not pinched for room, you will find it very convenient on many accounts to have cross walks of 12 feet, between the squares, not only to turn upon when ploughing, but for carting in manure, which will be a great saving of labour, besides being attended with many other advantages.

"Having staked your ground, when it is dry, and having as many vine cuttings as you can plant in half a day, soaking in rich dung water, in a pail, the but-ends being down, dig holes at every stake larger or smaller, according to your own judgment: for it matters not, so they are deep enough to contain the plant. But here I must clear up a point, which has led many people into mistakes, and rendered this work more tedious, and that is the throwing into the holes, in which the vines are planted, rich mould mixed with old dung, thinking that this must be a great advantage to the vine. This is a great mistake. For as soon as the vine shoots its roots beyond this rich mixture, into the common soil, which is many degrees poorer and colder, the roots, as it were, recoil and shrink back at a coldness and poverty, they had not been used to, and the vegetation is stopped, and the plant dwindles into poverty and barrenness; and if you examine the plant at bottom, you will find that instead of extending its roots to their usual length, it has shot out a great number of small fibres like threads, which extend no farther than the good mould, and these being quite insufficient to answer the demands of nature, the plant perishes, or remains in an inactive and barren state, whereas, had the vine been planted in the common soil at first, it would have met with no alteration, no sudden change to check

* The anonymous author in YOUNG's *Annals*, before mentioned, recommends six feet: a less distance is certainly improper. *Editor.*

its growth*. This shews that the soil should be well mixed; and let me tell you once for all, that the vine delights in a warm, comfortable, fruitful soil: but proves unfruitful and perishes in a soil cold and barren. Yet a soil may be too rich, or made too rank by dung, and this extreme is also to be avoided. But to return to planting our vines, the holes being dug according to your mind†, plant your vine, setting the foot forward from the stake, and bend it a little, without cracking the bark, and bring it gently up against the stake, so that one eye only remains above the surface of the ground. Let not the eye touch the stake, but look from it. Then mixing the ground well together, throw it in, and press it gently about the vine, till the hole is almost full, and throw the rest in lightly, without pressing, so that it may rise up to the eye of the vine, which ought to be about two inches above the common surface. By this means, the vine will be preserved from drying winds and the hot sun, till it begins to grow. Some place four or five paving-stones about the foot of the vine, not so close but that the roots may shoot out between them, and condense the air in hot dry seasons, and nourish the vine with moisture, and cool and refresh it when parched with excessive heats. In the northern states, the vines should be planted on the south side of the stakes, for the sake of the sun: In the southern states, they should be planted on the north side to avoid too great heat. The upper eye only shoots out branches, from which the head of the vine is formed. If any shoots should rise from below, which sometimes is the case, the sooner they are removed, the better; these are called suckers, and very much exhaust the vine. And thus you proceed till all be finished.

"When your vines are all planted, if you have any cuttings remaining, plant them in a nursery or along the north side of your stakes, for you will have occasion for them, as many of your vines will miscarry, and the sooner their places are supplied the better. If some of your vines do not shoot till July, do not give them up; they may grow notwithstanding. I have had many that have not shot till August, and yet have done well. The filling up all the vacancies, where the vines have miscarried, is absolutely necessary to be done so soon as possible, either the fall after the vines were planted, with plants, if you have any growing in your nursery, which are best set out as soon as the leaf is fallen; or the next spring, with cuttings, which is the best season for planting them; for the latter having no root suffer greatly in the winter season, and if planted in the fall, most of them perish. Some plant two cuttings in a hole, lest one should miscarry. To this the chief objection is, that hereby the regularity of your vineyard is hurt,

* This direction is of great consequence. The ground must be *uniformly rich and light*, for at least three feet below the surface; or success need not be expected. *Editor.*

† Mr. Montmollin recommends to dip the lower end of the cutting in a mixture of bee's-wax and hog's-lard, to prevent the loss of sap which sometimes takes place. *Editor.*

many of the vines standing out of rank and file. For a well regulated vineyard resembles a fine regiment under proper and exact discipline. If some of your vines prove weak the first summer, and do not recover strength the second summer, though manured and cultivated well, root them out, for they very seldom are worth raising; and plant healthy vines in their stead, out of your nursery.

" In digging up the plants from your nursery, be careful to take them up without wounding or bruising the roots, and having a pail or small tub, half full of rich dung water, put the plants with the roots down, into that, so shall they be preserved from the sun and drying winds, which would soon parch and dry up these young tender roots and kill the vine. When you have dug up about a dozen or twenty plants, proceed to planting, in the following manner: Your holes being dug deep, and sufficiently wide, for the roots to be spread in at full length, throw in some loose earth, and spread it over the bottom of the hole, and fix in your plant near the stake, so high that the little branches rise an inch or two above the surface of the ground. The roots, you will perceive, for the most part grow in rows, one above another. The upper roots of all, which are called the day roots, must be cut away; the under roots of all must then be spread at full length, and covered with earth, then the next must be served in the same manner, and so on till all be regularly extended and covered.

" Your vines being all planted as above directed; and the vine cuttings, with one eye only above ground, and that almost covered with light earth, to preserve them from suffering with heat and from drying winds till they begin to grow; this upper bud only will shoot out branches, and the lower ones will throw out roots: And this is much better than to have two or three buds above ground, and branches growing from them all, which only serve to weaken the vine, and to hinder the forming of a good head, which is the first and chief point to be gained and well secured.

"We now proceed to the management of the vine in its infant state, upon which will very much depend the success of your vineyard.

" There are but two ways of forming and managing of vines to advantage for vineyards, viz. By stakes or espaliers." CHAPTALL says 'The method of cultivating vines on poles or props ought to be commanded by the climate. This method belongs to cold countries where the vine has need of the whole heat of the sun. By raising them therefore on poles, placed perpendicular to the ground, the earth, being uncovered, receives all the activity of the rays, and the whole surface of the plant is exposed to their action, and allows the vines to be placed nearer to one another, and the produce to be thus multiplied on equal surfaces. But in warmer climates the earth requires to be sheltered from the excessive heat of the sun: the vines are therefore suffered to creep on the ground. But when the increase of the grapes has attained to its *maximum*, and nothing is necessary but to bring them to maturity, the cultivators collect in bundles the different branches of the vine, uncover the grapes, and by these means facilitate the ma-

turation.' The northern and southern states of the Union may profit by these facts.

"I shall begin with the proper culture of vines that are designed for stakes.

"In this case the head of the vine is formed near the surface of the ground, and this method is now generally practised throughout wine countries, and indeed it is the only method proper for countries, where the frosts in winter are so hard as to hurt vines.

"The first summer after the Vine is planted, you have nothing to do, but to tie up the little branches to the stakes with a soft band, as soon as they are grown about a foot or fifteen inches long, which will save them from being torn off by hard winds; to keep the ground clean and free from weeds and grass. If you have any litter, short straw and chaff, the shives of broken hemp or flax, the chaff of flax seed, the dust and chaff of buckwheat, and the straw trod fine with horses when it is dry, any or all of these spread over your vineyard after it is hoed or ploughed and harrowed, will keep down the grass and weeds, keep the ground moist and light, and will greatly preserve the good soil from washing away. If this be done the first three or four years, it will greatly forward the vines; bring the ground into good heart, and finally, prepare it to produce good crops, by keeping it loose, airy and light, in which vines greatly delight."

The writer in Young's *Annals*, above noted, recommends four ploughings; the first time in February, when the furrow must be levelled, and left in that state for six weeks; (this however is in general too soon) the second time, the furrow must be reinstated. The third time, the same operation as the first must be repeated, *taking care not to plough* when the vine is in blossoms or flowers. The fourth, in August, as at the second time. The grass must be destroyed by hoes;" For this purpose the light shim or scuffle described in vol. 3. p. 295, would answer well.

"In the month of September, when the leaf begins to wither and fall off, as I have already observed, cut down all the branches, to one good bud each, and always remember that the lowermost bud next the old wood, is called the dead eye, and is never reckoned among the good buds. When thus trimmed, take away the dirt from the foot of the vine, about four inches down, and cut away all the upper roots that appear above that depth. These are called day roots, and must be taken away every fall, the first three years. The best way is, not to cut them off close to the body of the vine, but about a straw's breadth from it, so shall they not be so apt to grow again. Let the foot of the vine be left open, after the day roots are cut away, that it may dry and harden, till the hard frosts come. Then the holes are to be filled again, and the head of the vine covered with chaff and short straw mixed, or with bog hay, or salt hay, or with horse litter, that is free from dung and grass seeds; for these should be carefully kept out of a vineyard, which will save the labour of rooting out the grass that would spring from them. Some cover the head of the vine with the ground when they fill up the holes; but this is wrong, it greatly endangers the vine, as I have found by experi-

ence, for I have lost many of them by this management, before I discovered the danger. The ground, in warm rains, moulds and rots the vine. For the same reason, suffer no dung to be among the straw, hay, or horse litter, with which you cover your vines. The heat of the dung, in warm rains or muggy warm weather, will mould and rot them ; the cooler and dryer they are kept, the better. When you trim your vines, if you find that any of them have miscarried, which is very common, plant others in their room immediately, of the same sort in your nursery ; or provide cuttings of the same kind, and preserve them till spring, and plant them in the vacant places. that your vineyard may be full and compleat as soon as possible.

" The second summer let the shoots grow, till they are ten or twelve inches long, then choose eight, that are short jointed and much of a size, that grow on all sides of the vine, and with your finger strike off all the rest. If any one branch among the whole number, appears much more thrifty than the rest, you may perhaps be tempted to save it ; but let not your eye spare it. It will only prove a thief and a robber. It will draw to itself the chief nourishment of the vine, and starve the rest of the branches, and after all will bear but little fruit. The *short jointed branches*, prove the best bearers, and these standing on all sides of the head, preserve the vine in full strength and vigor. For this reason the rounder the head of the vine is formed, the better. If the branches be suffered to grow from one side of the head, the other side suffers greatly, and is apt to perish.

" This year there should be two stakes to a vine, one on each side, to fasten the branches to, by this means they are spread at a distance from each other, and grow the stronger and better. Whereas, when they are huddled all together, and fastened up to one stake, they suffer greatly for want of the sun and air to dry them after rains, mists and heavy dews: and in close muggy weather, they will mildew and rot. Let your vineyard always be kept clean and free from weeds and grass ; and the dryer the ground is, and the hotter the weather, the more effectually they are destroyed, by hoeing, ploughing and harrowing..... But remember never to meddle with your ground when *it is wet*.

" This second summer your main branches should be suffered to grow about five feet long, and then the ends of them must be nipped off, in order to keep them within proper bounds. The lateral or secondary branches should be nipped off at the end, when they are about a foot long, the nephews also should be nipped off when they are about six inches long. This is much better, than the taking all these smaller branches clean away, which is the practice of some..... For I have found, by experience, that when these secondary branches are clean taken away, the main branches suffer ; they grow flat, and appear distorted; which plainly shows, that nature is deprived of something, that is essentially necessary to her well being. It is quite necessary to nip off the main branches, when they are grown about five feet long. They grow the larger and stronger, the wood ripens the better, the lower buds are well filled, and better prepared

for the bearing of fruit. Some time after the tops of the main branches are nipped off, they will shoot out a second time, and then they generally throw out, from near the end, two branches instead of one; these also must be nipped off; at the same time the lateral or secondary branches must be looked to and nipped off, if any of them are shooting out anew.

"In the fall of the year, as soon as the leaf begins to wither and fall off, cut the branches down again to one good bud each, and take away the earth round the heads of the vines, as before directed, and cut away the day roots, and manage them in the same manner as you did the fall before. Now as some of your forward vines will bear fruit the third year from the planting, and as it is natural for you to desire to know what sort of fruit your vines will bear: I would advise you to set aside two or three at most, of each sort of your most thriving vines for that purpose, and instead of cutting down all their branches to one bud each, like the rest, leave two branches on each of these vines, with two or three good buds each, which will shew some fruit to your satisfaction..... But be persuaded to prevent the rest from bearing fruit till the fourth year, and the weaker vines till the fifth year, for it greatly weakens a vine to bear fruit when so young.

"The third summer manage your vines in the same manner as the second, tying up all the branches to the stakes, one above another; only of those vines that are to bear fruit, the fruit-bearing branches should be tied up above the rest, that the fruit may have the benefit of the sun, the air and winds, all which are necessary and conspire to bring the fruit to maturity; and this should always be the practice. This year a third stake is to be provided, which in the spring is drove down just on the north side of the vine, upon a line with the rest, for order sake. To this stake the branches that bear fruit, will be best fastened, because there will be the more room for the branches of reserve, which are to bear fruit the next year, to be distinctly fastened to the side stakes. These branches of reserve are now of great importance to the owner, as the next crop will depend upon the right management of them. They are, therefore, to be carefully tied up at proper disdistances, to the side stakes, that they may grow well, that the wood may ripen, and that the buds may be well filled. When they are grown about five feet long, the ends must be nipped off, the lateral branches kept short, and the nephews restrained; whereas, if they are all tied up to one stake, the wood remains green and spungy, and does not ripen, the buds do not fill well; and where the band is, all the branches mildew and rot. As to the few vines that bear fruit this summer, let the fruit-bearing branches be nipped off five joints above the fruit, and let the side branches and nephews be kept short as above directed.

"In the fall of this third summer, preserve two of the best short jointed branches of reserve, one on each side of the head of the vine, for bearing fruit the next year: the rest cut down to one good bud each. If some of your vines be very strong and flourishing, you may preserve four branches for bearing fruit, but by no means more, one on each quarter of the vine; the branches on the few vines, that

bore fruit this year, must be cut down to one good bud each; for the same branch must never be suffered to bear fruit two successive years, unless you fall short of branches of reserve, in that case, let the old branch bear a second time, but they seldom or never bear so large clusters, nor so fair fruit. On all the vines, that bore fruit this year, not above two branches on each, should be kept for bearing fruit the next year, they will last the longer, and bear fruit the more plentifully hereafter. The rest of the management is the same with that of the last year; only some time in the latter end of November or somewhat later, if the hard weather keeps off, a small long trench on each side of the vine, is to be dug with a hoe, and the branches that are kept for bearing fruit, are laid down gently into them, without forcing them so as to crack them, or split the bark, or strain the wood too hard, and must be covered over with the earth. If any part appears above ground, it must be well covered with straw, bog or salt hay, and indeed if the whole that are buried were also covered in the same manner, with straw, &c. it would be best; for the branches being of an elastic nature, they are very apt, upon the thawing of the ground, to rise with their backs above the ground, and remain exposed to the weather, so that your crop may be lost notwithstanding your trouble, which a small covering of straw or hay will prevent. If any of them should be so stiff and stubborn as not to bend down, then bind straw round them and the stake.

"In the spring of the fourth year, the branches that have been preserved for bearing fruit, must be carefully trained up to the side stakes, the higher the better; and the branches that shoot out from the head this spring, which are called branches of reserve, and are designed to bear fruit the next succeeding year, must be tied up to the stakes below the fruit bearing branches, and one or two to the middle stake, if there is room; for oftentimes the fruit bearing branches, occupy the middle as well as the side stakes, and especially in a plentiful year. The management of the vine in its bearing state, calls for a close and particular attention."

The writer in YOUNG's *Annals*, says, 'In about four years, when the sprouts, planted in a great plantation will have taken root, towards the end of the winter, they must be bent, and bound about ten inches above the ground. For that purpose stakes must be procured one inch or more thick, and two feet three inches long. They must be sharp at one end, and driven into the ground with a mallet, about half their length, at the distance of two feet from one another, and on the same line as the vines. Care must be taken to place one of them close to each vine. To these stakes fixed as above, is fastened a long pole or reed, eighteen feet long, or more, and one inch thick or more, and tied horizontally at about ten inches above the ground, leaving about five inches of the stakes above them. These poles must be fastened to the stakes with oziers *.

* The common yellow or basket willow of the United States, if planted near

'To these horizontal poles are tied the branches of the young vines, to keep them near the ground, by which means, the fruit is warmed by the reflection of the sun from the ground, and arrives at maturity. In order to fasten each vine, the stake is cut three or four inches from the ground; only two divergent branches, about twelve or fifteen inches long are left. They are bent in the form of an arch, and fixed to the poles with oziers. These branches are called the arms; the grapes hang from these branches, and sometimes touch the ground. In that case the earth is removed two inches from the grapes to prevent them from rotting.'

"Some who have written best upon this subject, recommend the taking away all the lateral or secondary branches and the nephews close to the body of the fruit bearing branch, and to leave only the main leaves of that branch, thinking, by this method, that all the nourishment of the vine is thrown into the fruit. They also order the top of the branch to be taken off, within three joints of the uppermost cluster of grapes. Others again are for following nature, and suffer all the branches to extend themselves as they will. These I look upon to be, two extremes, and think that a middle way, is every way best, most rational and safest. I know, that when these smaller branches are taken clean away, the main branches, instead of growing round, full and plump, which is their natural state, become broad, flat and distorted, and have an unnatural appearance..... Besides these branches, when kept within proper bounds, serve to shade the fruit from the scorching rays of the sun, and to screen them from violent winds, from hail and beating rains, from damps and fogs, cold nights, and dews, which are all injurious to the fruit, as well as the cold dry north-east winds, and the cold driving north-east storms.

"Before I proceed to the management of vines for the frame or espalier; it will be necessary to acquaint you with some things of a general nature.

"When vines are trimmed in the fall, which they ought to be as soon as the leaf withers and falls off, they seldom bleed. If vines have been neglected and not trimmed in the fall, let it be done in February, if good weather happens, or early in March. If it be done later, they will bleed too much, and endanger the crop. Searing the wound, as soon as it is made, will prevent the bleeding. In trimming, keep about two inches from the bud, or half way between bud and bud. The rule is, to cut sloping upward, on the opposite side to the bud, that the slope may carry off the tears from the eye, but I never found this any kind of security to the eyes below. If searing every wound be thought too much trouble, the only remedy, besides that, is, to wash the branches that are wounded and bleed, and especially the buds, with a rag dipped in warm water, without touching the wound, which in eight or ten days will stop of itself; the liquor forming a stiff jelly upon the wound, like coagulated blood, and drying by degrees, heals up

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water, and *kept closely* trimmed, becomes very pliable, and answers very well for binding.....*Editor.*

the wound. The washing must be deferred till they have done bleeding. Unless this is done, the eyes below will be in danger of being blinded. For so glutinous is the sap, that it binds up the bud it reaches, so that the leaves cannot open and unfold at the time of vegetation. In cutting off large limbs from old vines, it sometimes happens that ants fall upon the pith, eat their way in, and make a hollow, where the water settles and rots it. In this case the remedy is, to cut such branches close down to where it is solid and green, and it will bark over and heal.

"It is common for large buds to shoot out two or three branches each. One only on each should be suffered to grow; if you expect fruit on them, be not in a hurry to strike them off, till you know which is most fruitful, and save that. Vines that are close planted in a vineyard, cannot be expected to bear so much fruit, as single vines, or as those that are planted at a distance: and this is a sufficient reason for restraining them, and for limiting the number of bearing branches, if you mean to make good wine, to keep your vines in full vigour, and to preserve them for many years."

It is the practice of some vignerons to lay down and bury 1 or 2 branches the 2d or 3d year, thus enabling the vine to shoot out roots from every joint, and to become very strong, and even to thrive more than the parent vine. This practice is called in France *Provigner*, and is constantly followed by Mr. MONTMOLLIN who cultivates vines with great success, near Philadelphia. In the succeeding year, the branch which had been laid down, must be cut off close to the main stem. In setting out vines, room should always be left for laying down, hence the propriety of planting the cuttings at eight or ten feet distance from one another.

"When vines have been covered with earth during the winter season, let them not be uncovered in the spring, till the hard frosts are over, and then let it be done in a fair, warm, drying day, that they may dry before night, for if they should freeze before they are dry, it would greatly hurt, if not ruin the crop.

"The head of the vine, properly speaking, when it is formed near the ground, is composed of the butt-ends of the branches, that are cut down to one good bud each, which ought to be eight, at least, in number. These branches, the second year of the vine's growth, shoot from the solid wood chiefly, and then is the critical time to prepare for forming a proper head to a vine; therefore preserve eight of the best short jointed branches, that grow on all sides of the stock, and much of a size, and these must be carefully tied up singly to the stakes, that the buds may fill well, and that the wood may ripen, on which greatly depends the future success of your vineyard, as this is the foundation of the whole. If more than eight branches have grown from the head, the rest must be struck off with the finger. If one of the branches outgrows the rest, and appears more flourishing, that in particular must be struck off.... For if suffered to grow, it will rob the rest of their due proportion of nourishment, and ruin the vine.... Eight branches are sufficient for a thrifty young vine, four of which

are intended for bearing fruit, when that time comes, and the other four are designed for branches of reserve. The third year, which is the first year of the vine's bearing, the lowermost good bud on the bearing branches, will produce one or two clusters of grapes each..... The fourth year, two or three of the lowermost buds will bear fruit, and after that five or six of the lower buds will bear fruit, but seldom more; so shall you have five or six branches, growing from each bearing branch, producing fruit, which 20 or 24 bearing branches upon one vine, and each of these branches yielding two, three or more clusters, according to the fruitfulness of the year, and the due cultivation of your vineyard.

" Nay, if your vines are well chosen, as I have directed, and properly cultivated, and your soil kept clean and well improved, you shall, in a fruitful year, see some of the secondary branches and even the tendrils bearing fruit. This happened to some of my vines in the year 1767. I had four successive crops hanging on several of my vines at one and the same time, one under another, which I shewed to several gentlemen, who admired, and were surprized at such a production: but I took away all but the first crop, lest my vines might be too much weakened by over-bearing. I mention this to shew what nature will do in a favourable year, under proper management. And here I must remark, that the greater the vintage, the better the wine, but a meagre thin crop produces thin weak wines, which require dexterity and art to make them fit for use; but this I shall instruct you in, when I come to the making of wine.

" In transplanting vines or trees of any kind, I have by long experience found, that removing them in the fall, after the leaf is fallen, is much surer and safer, than doing it in the spring. For if trees are well staked, so as to stand firm against hard winds, the ground will be so well packed about the roots, that they will grow in the spring, as if they had not been removed, and are in no danger, if a dry season should happen, especially if some horse litter or old hay be thrown round them in the spring, so as not to touch the stem. Whereas if they are removed in the spring, and a drought succeeds, before the ground be well settled about the roots, many of them will miscarry.

" As vines are best planted upon rising grounds to prevent too much wet, and as it is necessary to keep the soil loose and mellow, it thereby becomes the more liable to washing away by hard rains, which must be a great injury to a vineyard; now if by any means so great an inconvenience might be avoided, it would be a great point gained; and, therefore, it very well deserves our attention: For it is no small cost and labour to renew the soil, that is sometimes carried off by sudden floods of rain. I have tried several ways to prevent this evil, so as neither to injure the vines, nor hurt the crop. The following method, where a person has the conveniency, I find to be the most effectual. Lay broad flat stones, not exceeding two inches in thickness, close along the lower side of the vines, after the ground has been made loose and mellow. These stones being broad, and not very heavy, do not press hard upon the roots of the vines, nor

pack the ground too close. They reflect great heat up to the vine and fruit, which helps to bring it to full maturity; they preserve the soil from washing away, they keep the ground moist in the driest times, and hinder too much wet from penetrating down to the roots near the head of the vine, which chiefly occasions the bursting of the grapes, when they are near ripe, after a shower of rain. To prevent this evil, is one reason for cutting away the day roots, which extend themselves along near the surface of the ground. But where such flat stones are not easy to be had, I would recommend short straw mixed with chaff, the shives of flax and hemp, the chaff of flax seed, which is also an excellent manure, old half rotten salt hay, or bog hay, free from grass seeds, spread thin between the rows; if it be spread thick, it keeps the ground too long wet and cold in spring, which retards or keeps back the growth of the vines..... These I have experienced to be profitable, and very much to hinder the soil from washing away. On the side of steep grounds, of hills and mountains, stones in proportion to the descent, or logs of wood, where stones are not to be had, must be laid along the lower side of the vines, to keep the soil from washing away, which otherwise it will do, to the great damage, if not the ruin of your vineyard; and therefore when you begin a vineyard, remember that this is one, and an essential part of the cost.

" A vineyard will thrive the better, and the crops will be more sure, if it be well screened, by some good fence, buildings, mountain, or thick copse of wood at a small distance, from those points that lie to the north of the east, and to the north of the north-west; the winds from those quarters, in the spring of the year, being very unfriendly to vines. But then a vineyard should be quite open to all the other points of the compass. For vines delight much in an open, clear, pure, warm air, free from cold damps, fogs, mists, and from condensed air, arising from bogs, swamps, and wet clay grounds, and from large tracts of neighbouring woods. The north-west winds, indeed are rather advantageous to a vineyard: For although in America, they are extremely cold in winter, and occasion severe frosts, yet as the vines are then covered, they do them no harm. Besides those winds are generally drying and seldom bring wet; in the spring and summer they are always cool; and I find, by long experience, that they are quite necessary, to brace up, harden and confirm the leaves and tender new shot branches of all trees and vegetables, which otherwise remain languid and weak.

" There are three seasons when careful and experienced vignerons deny access to their vineyards, first when the ground is wet, because then the weight of a man presses down and packs the earth too close and hard upon the roots of the vines. Secondly, when the vines are in blossom, because if they are then disturbed by handling, shaking, or rubbing against them, the farina or fine dust that is formed on the blossom, which impregnates or gives life to the fruit, is shaken off and the fruit miscarries. Thirdly, when the fruit grows ripe, because the temptation is too strong to withstand, and people will pluck

off the fairest, ripest grapes, which vignerons do say is an injury to the whole bunch; be that as it may, it certainly is a great injury to the owner, for the fairest, ripest grapes make the richest and finest flavoured wines.

"I now pass on to the management of vines upon espaliers: but then you are to remember that, the training up of vines to these frames, is only fit for the southern or warmer climates, where the winter frosts are not so severe, as in our more northern regions; for as they are to stand exposed to all weathers, the germ or bud, from which the grapes do spring, are apt to be chilled and destroyed by the severity of a sharp season, and especially by moist sticking snows freezing hard on the branches.

"The first year the young vines are trimmed and managed in the same manner you have been before directed.

"The second year, set apart two of the best short jointed branches, on each vine, that you may be secure of one, in case the other should fail; for all vignerons well know, that vines shoot forth more barren and unfruitful branches, than fruitful ones; therefore always set apart short jointed branches for bearers, and strike off all the rest of the branches with your finger. Again, chuse fruit-bearing branches, that grow as near the head and shoulders as possible; train them up as straight as you can, one on each side of the stake: when they are grown about 15 inches long, bind them gently with a soft band to the stake; for they are then yet very tender: and, as they grow longer, bind them a second and a third time; and, when they are grown up to the top of the stake, which must be five feet high, nip off the ends. When you have taken away the tops of the vine she will try to recover herself, and will shoot out two branches at the top instead of one; but these you must also nip off, and keep short, but take away none of the lateral branches or nephews till you come to trim them in the fall, only nip them off to keep them within proper bounds. In the fall when the vine-leaves begin to wither and fall, cut away one of these standards from each vine, close to the stock, leaving such as you best like, which is now out of danger, and trim away from her all the branches and nephews, and cut off her top within three feet and a half of the ground; leave four buds at the top, and cut off all the ends of the buds below them; all these wounds will be healed before the hard weather comes on, which should not be over severe where espaliers are used; the two upper buds will be the arms of the vine, the two lower buds will be shoulders, and just under these the vine is fastened to the espaliers, and is called the head of the vine. It requires the greatest skill to manage and cultivate vines thus educated, and trained up to espaliers.

"The third summer the espaliers being regularly set up, six feet high, in a line with the vines, the posts being of some lasting wood, as of red cedar, locust, mulberry. or good thrifty chesnut, in the middle space between vine and vine; and the rails being four in height, and placed on the north side of the vines, the lowermost about three feet from the ground: the vine must be fastened with a soft yet strong band to a stake firmly fixed down near the foot of

the vine, and fastened to the frame, near the lower rail, the four buds rising above it. When these buds shoot forth their branches, they must be regularly trained up to the rails above by a careful hand; because these branches, at first, are very tender. When the branches are grown up to the top of the frame, the ends must be nipped off even with it, and kept down even with the frame, that they may keep within the limits assigned them. The lateral branches and nephews also must be kept within proper bounds and not suffered to grow too long. If any fruit should appear this third year, which may happen, let it be taken away.

" In the fall of this third year, the lateral branches and nephews must be carefully cut away from the main branches, so as not to hurt, or rub against the lower buds, with the back of the knife, which is frequently done, by cutting off the branches too near the germ or bud. The four main branches, that sprung from the four buds, must now be cut down to two good buds each. In cutting off the main branches, cut slanting upwards, and let the slope be on the opposite side of the bud, that if it should weep, the tears may drop free of the bud. In cutting, approach not too near the bud that is left, but keep at two inches distance from it, lest you endanger it, by letting in the cold air and wet upon it, before the wound can heal.

" If any fruit should appear on any of the branches. that grow from the shoulders, which is often the case, let them be taken away as soon as they appear; for these being branches of reserve, they are designed to bear fruit the succeeding year: the arms only are to bear fruit the present year: these directions will serve for the fourth, the fifth, and the succeeding years.

" In the fall of this third year, I have above directed you to cut the four main branches, that grew from the four buds, down to two good buds each, but this is designed for the strong vines only; those that are weak, must be cut down to one good bud, each branch; and if any fruit should appear on the weak vines the fourth or even the fifth year, strike them off as soon as they appear; and once for all, be persuaded not to overload young vines with fruit.

" The fourth year when you trim your vines in the fall, you may cut the arms down to one good bud each, instead of taking them clean away; these will bear fruit the next, and then you can save the two lower buds, that grew on the branches that sprung from the shoulder, for branches of reserve, by taking away the fruit as soon as they appear, and these will bear fruit the year after.

" The sixth year you may have three good buds on each branch for bearing fruit, and the seventh year you may have four buds on each branch, which will make eight bearing branches, which are sufficient for the strongest vines.

" Vines that are designed for espaliers, must be planted further asunder than those that are intended for stakes.

" One general rule is, in trimming vines, that the young wood, that grew this year, must be preserved for bearing fruit the next year, and those branches, that did not bear fruit, are better for the purpose, than those that did bear fruit; and for this reason, strike off, with your finger, the young

clusters from those branches which you reserve for bearing fruit the succeeding year. When I mention a branch, I mean a main branch of young wood, not a side or lateral branch, that grows upon these young main branches.

"When the arms have borne fruit, they are to be cut clean away in the fall of the year, as soon as the vintage is over, provided you have branches of reserve, growing on the shoulders, to supply their places; but if you have been so unlucky as to have failed in these, you must cut the arms down to two, three, or four buds each, according to the strength of the vine; but then remember, not to suffer any fruit to grow on the branches, that spring, from the lower bud on each old arm, these being now absolutely necessary for branches of reserve, in order to recruit the arms the next year.

"As some of our southern states have a hot sandy soil, and are subject to great heats and parching droughts, and thereby find it very difficult to raise and preserve vines, so as to become fruitful; I shall here offer some thoughts and directions, which I imagine most likely to succeed in these parching hot countries.

"In the southern states I think it necessary to shade the young vines the first two or three years, during the hot dry seasons, by driving down firmly in the ground, branches of trees thick set with leaves, on the south side of the vines, and to water these young vines twice a week, during the hot dry seasons, in the evening; the branches should not be tied up to stakes, but should be suffered to run on the ground to shade and keep it moist and cool. These vines must be trimmed in the same manner as those which are designed for stakes, as soon as the leaf falls, or the vintage is over. The third year, instead of driving stakes down to fasten up the branches to them, let short crotches be drove down about six feet asunder, and pretty strong poles laid across upon them, so that they may lie about 14 inches from the ground, and so near to each other, that the branches of the vines may conveniently run upon the poles without dipping down and running upon the ground; if the ends of the vines should run beyond the sides of this bed of poles, they must be turned and confined to their proper bed: because it will be necessary to have a walk or path of two feet wide between bed and bed to regulate the vines, and to gather in the vintage.

"This bed of poles should be so placed, as to extend three feet on each side of the row of vines, so that the rows of vines, standing eight feet asunder, there will be a path of two feet between row and row for the necessary purposes beforementioned. Particular care must be taken, not to take away too many branches from these vines, unless there should happen an uncommon wet season, nor to keep them too short, because they are designed to shade the ground as much as possible; but then in the beginning of August, or about a month before the different sorts of fruits begin to grow ripe, each in their proper time, take away the lateral branches and cut off the tops of the main branches, but this must be done, not all at once, but by degrees, to let in the sun and the air; the wetter the season, at this latter part of the summer, the more branches must be taken away, and the shorter the main branches must be cut, and if ne-

cessary most of the leaves must also be plucked off: the fruit will ripen the better.

"Here I would observe, that the same management with regard to the thinning the branches and the leaves at this season of the year, is necessary for vines that are fastened to stakes or espaliers, in order to meliorate and hasten on the full ripeness of the fruit; and remember that the longer white grapes hang on the vines, even after they are ripe, if the season be dry, the richer wine they make.... But it is otherwise with the black grapes; when they are full ripe, they must be gathered and made up into wine, if not, they rot and dry away suddenly, and perish in less than a week.

"A vineyard planted on a piece of good strong new ground needs no dung the first seven years. The best manure for a vineyard is such as is warm and free from grass seeds, for grass is a great enemy to vines: fowl's dung of every kind, except water-fowl; soap-ashes, or other ashes sprinkled thinly between the rows of vines, but not too near them; for this manure is very hot and sharp, and is best spread on the ground in the fall, that it may mix with the soil, and be properly tempered before the heat of the next summer comes on, otherwise it would burn up the plants; the rich soil that is washed down and settles along the sides of brooks and rivers, and in many low places along roads and highways; sea sand, mixed with common soil that might be taken up along the highways; in short, sand of every kind mixed in large proportions with good soil, is very comforting to vines, for those vines produce the sweetest and richest grapes, and the strongest and best flavoured wines, that grow in rich sandy soils: the mortar of old buildings, that has been made of lime and sand, pounded fine; the dust of charcoal, the small coal and the earth that the coal kilns are covered with when burnt; the soot of chimneys; the small cinders and black dirt found about smith's shops: all these are excellent manure for loamy or clay grounds to warm, to open and to dry them, and especially if a large quantity of sand be mixed with it; creek mud, or the mud along the sides of rivers thrown on in the fall, or thrown up and sweetened all winter, and laid on in the spring, is a rich manure for sandy lands, or for clay and loamy lands if mixed with a good quantity of sand. All warm rich untried earth is excellent, so is street dirt of cities."

Grapes often drop off when about ripening, without any evident cause. To prevent this, citizen Lambry of the department of the *Seine and Oise*, directs the following mode, which he says he found successful, viz.

Cutting a circular incision in the wood, and taking away a ring of the bark about the length of two *millimetres*.

The wood acquires a greater size about the incision, and the operation accelerates not only the maturity of the wood, but likewise that of the fruit. The vines on which the incision is made too deep, and further than the bark, will be spoiled both in wood and fruit. *Monthly Magazine*, vol. viii. p. 557.

"The best method I ever discovered to get rid of birds, was to destroy their food, that ripens about

the time as the grapes. Their food consists of wild cherries and poke-berries chiefly*. Wasps are great enemies to grapes; the best way I have met with to destroy them, is to hang up phials here and there, along the outward rows of vines, filled half full of water well sweetened with honey, molasses, or coarse black sugar, the mouth of the phial must be so wide as easily to receive a wasp into it, and not much wider, the wasps soon find out the molasses by its scent, and getting into the phial, are drowned in the sweetened water. Another way I have discovered, which comes very near to the former, if it does not exceed it, which is to cover flat wide earthen pans, all over the bottom with honey or molasses without water, if there be three or four of these pans placed at a good distance, the whole length of the vineyard, every wasp to leeward, that is within smell of them, will come to the feast, they will soon entangle themselves in the molasses, that if you attend them, you may make it a deadly feast to almost all that come; when the wind comes from another quarter, place your pans along another part or side of your vineyard, that so the wind may blow from the vineyard to the place from whence you would draw the wasps, and so go round till you have destroyed them all.

"The same grub, which is a short smooth earth worm, that cuts off the English beans, &c. is very hurtful to young vines; if the earth were taken away round the foot of the vine, about two inches down, and some tar and hog's-lard, mixed in equal quantities, were daubed round that part of the vine, I think, though I never have made the experiment, it would prevent the mischief.

"Vine fretters also are often injurious to vines; they are very small animalculæ, or insects, of what species, I have never examined, but they appear in great numbers, in mere clusters, upon the young tender branches, upon the juice of which they feed; the only remedy I know, is to take away the branch with them upon it, and so destroy them bodily; but if the branch cannot be spared, they must be mashed and rubbed off by a careful tender hand; if they are chiefly destroyed the first two or three years, they are not so numerous nor so troublesome afterward."

Rose bugs are also very destructive to vines. They may be drawn off from the grapes, by planting many rose bushes round the vineyard.

"It is common with gardeners and vignerons, who cannot bear to see a good piece of ground lie idle, to raise a crop of cabbages, cauliflowers or brocoli, between vines when young. This is very wrong and very injurious to vineyards.... The soil cannot be too fresh for a vineyard.

"I have already mentioned the planting of vines at a proper distance, and in this I have exceeded

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* Mr. Legaux drives away birds in the following mode. Perceiving that they only committed depredations just before the rising and setting of the sun, he has two boys to patrole the vineyard, each with a whip in one hand, and a rattle in the other, making all the time, as much noise as they could for about an hour and a half. This process was continued for three weeks every year.

Editor.

the common distance practised in most vine countries; and that for reasons which I shall now assign.

"The advantages of this manner of planting I think are many; with a single horse plough, having a foot fixed in the fore part of the beam, by way of gage, to prevent the plough from going so deep as to cut the roots of the vines; a man, with the help of a careful boy to ride and guide the horse, (the horse always supposed to be tame and under good government,) may plough a full acre or more in a day, which is as much as six men will generally dig up with hoes, and is every way much better done; the furrows lying across the descending ground, will very much prevent washing away by hard rains; the ground lies light, hollow and loose, by which means it readily receives all the benefit of the atmosphere, the dews, &c..... After this it requires no more culture for twelve or fourteen days time, or more, according to the weather. If a drought succeeds the ploughing, it will need no other stirring till rain comes, provided the ground turned up mellow and crumble, which it will do if it was not wet when it was ploughed. If the weeds should appear, it must then be harrowed with a sharp iron tooth harrow; which the same man, boy and horse can manage; the man if careful and diligent, can with ease harrow three acres a day, and if this be repeated three, four or five days, after every rain, or upon the first appearance of weeds, they may with great ease be kept down. Again, when vines are planted at a proper distance, a wheel or a hand-barrow may pass freely through them, which will greatly facilitate the manuring of the ground and the gathering in of the vintage; or a horse with panniers on each side, made flat on the side next his body, or a long square basket fixed on a hand-barrow and slung across two hardy boys' shoulders, would give dispatch to either work. Vines too, planted at a distance, produce the best and richest wines, and to crown all, it is the opinion of men knowing and experienced in these things, that a vineyard planted at eight or ten feet distant each way, will produce as many and as fine grapes, as one planted within half that distance, though there be twice as many vines.

"The German double pick, or sarkling iron, is the best instrument for digging a vineyard; this instrument digs the ground with more ease than the hoe, and neither cuts nor wounds the roots..... It is fixed on the handle like a hoe, and bends downward as that does.

"Stakes are a necessary article, and must be about an inch and a quarter square, not less; if both ends were dipped in boiling tar, it will greatly help to preserve the stakes from rotting. The stakes should be six feet long, so as to stand five feet out of the ground, and should be drove by a line and stand strait.

"The materials proper to make bands of, to bind the vines to the stakes are, the sweet flag, otherwise called the *Calamus Aromaticus*. These long flat leaves cut in June and dried in the shade, and then bundled up and kept in a dry place for use do very well, but then they must be made wet when you bind with them. The long flat leaves of reed, the rushes and three square that grow in marshy

or meadow ground preserved and used in the same manner do as well." Bass of Russia matts is very useful.

"Having now gone through the necessary directions for planting and managing vines for vineyards, I proceed to the making of wine, a subject though short and easy, yet calls for great nicety and exactness. The making, fermenting and preserving of wine is a mystery to the people of America, but when the methods of managing these things are brought to light and explained, nothing appears more simple and easy; but before I proceed to this work, it will be necessary to give some directions about gathering the grapes.

"Grapes must be fully ripe before they are gathered; gather them in a fair day, when they are perfectly dry; and take away all the rotten and unripe grapes, for they spoil the wine: If your vintage be large, and you gather more grapes than you can mash and press out in one day, let them be gathered without bruising, for bruised grapes soon contract an unsavory taste and hurt the wine; however, if they are mashed the same day they are gathered, the bruising will do no hurt."

Chaptall advises to cut off the tails of grapes very short with a pair of scissars, and to choose none but sound grapes, and those clusters which are best exposed, rejecting those which have been sheltered, and near the ground, and to prefer those which ripen at the bottom of the vines. They are then to be put into small baskets to prevent the loss of juice, by the superincumbent weight; and when full they ought to be put in carts, or on the backs of men or horses.

"I would advise the gathering of them to be directed by some grave discreet person; for as this work is done generally by servants and children, it is made matter of pastime and frolic; and so many grapes are torn off, and either bruised or scattered on the ground, to the no small damage of the owner, both in the loss of fruit, and in hurting the wine: and these things should be impressed on the minds of the gatherers before they begin, that every thing may be done regularly and in order, by which means more work will be done, and to much better purpose.

"If white frosts happen before some of your grapes are fully ripe, let them still hang on the vines, and they will grow ripe, rich and high flavoured; but they must be gathered before the weather be so hard as to freeze the grapes, for that will spoil them: the light frosts that only kill the leaves do not hurt the fruit, unless it be such as are late ripe, these should be carefully covered from all frosts, they should grow against walls or board fences fronting the south or south-east, and at night be covered with mats or frames thatched with straw, which should be so contrived as to be set up to cover the fruit or let down at pleasure.

"As the wine made from black grapes has a different management from that made of white grapes, I shall begin with the white; these then must be gathered as I mentioned before in a fair day, when the grapes are perfectly dry; and both the rotten and unripe grapes being carefully plucked off from every bunch, the clusters are then thrown into the mash vat, and two or three men,

according to the quantity, having washed their feet and legs very clean in bran and water, get into the vat and trample and mash the grapes thoroughly, so that none escape."

Chaptall says, as a general rule, that the grapes must be equally pressed, to insure an uniform fermentation: and the vat filled in 24 hours, to avoid the inconvenience and imperfections arising from a successive series of fermentations, and when unexpected rain suspends the collection of the grapes, the juice of those already collected and placed in the vat, must ferment separately.

"The first and second pressing being mixed together is put into hogsheads, and filled within four inches of the bung, that it may have room to work and ferment, the casks placed in some warm room or dry cellar. Then having a small spile fixed in the middle of the head of the cask, the third or fourth day, draw a little of the wine in a glass, and if it be pretty fine, draw it off immediately into a clean dry well scented cask, the larger the better, so you have wine enough to fill it, which you must do within two inches of the bung, and stop it close, leaving only the vent-hole open for a second fermentation; after a few days it will work a second time, but not so much as at the first; if your wine be strong and good, which you may know by the age of your vineyard, and by the goodness of the seasons, it will be best to leave the bung-hole open for this second working, the wine will be the better: for strong wines require a greater fermentation than weak wines, and the stopping of the bung-hole, checks the working, and prevents weak wines from spending themselves too much, on the contrary, if strong wines have not a thorough working, they are apt to grow thick and ropy: by this you may form a proper judgment what degree of fermentation is proper for the wine that is under working, and govern yourself accordingly. Three or four days after the second fermentation begins, carefully watch your wines every day, again try them in a glass, and if they be pretty fine, prepare a cask sweet and good, burn a good large brimstone match in it, and as soon as the match is burnt out, whilst the cask is full of smoke, draw off the wine into it; now fill up your cask to the brim, and hung it up tight and stop the vent hole; the smoke of the brimstone will hinder any further fermentation; and this is called stumming or sulphuring; then make a mortar of clay and horse dung mixed up with strong flaxseed jelly, and covering the bung and vent hole close with it, let it stand till it is fit for use.

"When you first rack off, if you have any old wine that is rich and good, of the same kind or colour, put four or six gallons of it, and two gallons of good brandy into your cask (this quantity is sufficient for an English hogshead) and then rack off your wine into it for the first time, this will greatly strengthen and preserve it.

"When wine is in fermentation, all the gross parts are thrown up to the top of the cask, or vessel that it ferments in, and there meeting the air, they contract a harshness. *If then they are suffered to pass down through the body of the wine, which they certainly will do as soon as the fermentation is*

over, they will communicate those evil qualities to the wine. For this reason, draw off your wine both times before the fermentation be quite over." These *general* rules are of great consequence.

" I now pass on to the making of red wines from the black grapes. Red wines have a different management from the white; the whole of one or even two days treading or mashing, (where the vintage is great) is thrown into a large vat, the must, stalks, skins and all, and stands in some warm dry place or cellar. The vat is covered close with sheets or blankets, or both, and thus it remains, according to custom from four to seven or even ten days, according to the coldness or heat of the weather. This is done to obtain a strong fermentation, in order to give a deeper colour to the wine; and this is the only end proposed by it; the manager of this work, visits the vat twice a day, and in a glass views the colour of the wine and tastes it; if the tincture be not deep enough to his mind, he knows by the taste of the wine, whether it will stand a longer fermentation: if it will not, he contents himself with the colour it has, and draws and presses it off, and fills it into casks, leaving about two inches from the bung, for a second fermentation. When the second fermentation is over, which generally happens in four or five days, he then draws it off into clean well scented casks, and adds to it six gallons of good old wine and two gallons of brandy to an English hogshead, which contains from 60 to 63 gallons. Where the same kind of wine is not to be had, he makes use of Port wine. He then fills the cask quite full and bungs it up tight, leaving only the vent hole open to let out the generated air. Note: when I say, where the same kind of wine is not to be had, he makes use of Portugal wines, this is mentioned for our practice, not that the French make use of such wines, for they always have wines enough of their own of the same kind.

" Besides the main pulp or core of the grape, which is white in black grapes as well as others, there sticks to the inside of the skin, a considerable body of rich pulp, of a deeper die in some than in others. This pulp gives the colour to the grape, this same pulp also gives the colour to the wine, for *the same grape is capable of making white wine as well as red wine*; if the main core which is first trod out, be only used, the wine will be white; but if the red pulp be mixed with it, it makes it of a rich purple colour; as this is a clear case the great point of improvement is, to dissolve or extract this rich pulp, without injuring the wine. That the present method is the best and most effectual to that purpose, I can by no means think; the violent fermentation through which the wine is made to pass, in order to procure the tincture, must exhaust the spirits in a very great degree, and leave the body in a weak and languid state, and subject it to harshness, to turn eager or vapid in a short time; I think I have reason to conclude, that if the husks or skins, after four days lying in the murk, were taken out, and thrown into the mash vat, and trod over again, and especially if some of the *must*, or rather wine, be now and then thrown over the husks, in order to wash away the pulp,

that a full tincture may be obtained, without torturing the wine, as the present manner is, and without running so great a risk of spoiling it."

On the proper *fermentation* of the juice of grapes depends the quality of wine. For this reason the following extracts are given from CHAPTALL's excellent treatise on the subject, and are particularly valuable inasmuch as they refer to the practices pursued in various parts of France, each of which has a climate nearly similar in the United States.

" The method of disposing grapes to fermentation varies in different countries. The stalks are harsh and austere, and wines produced from grapes not freed from stalks, do not participate in that quality; but these are weak and almost insipid wines, and are apt to become oily. Fermentation also proceeds with more force and regularity, in *must* mixed with the stalks, than in that which has been freed from them. Near Bourdeaux the red grapes are freed from the stalks, when it is proposed to obtain good wine, and when the grapes are not quite ripe, and when frost has taken place before they are collected, but when the grapes are very ripe, it is performed with less care. The stalks facilitate fermentation, and effect a more complete decomposition of the must, and produce all the alkohol it is perceptible of yielding. But it is added, this is only necessary when the wine is to be distilled. When delicate wine is to be prepared for drink, it is necessary to withdraw the stalks from the fermentation, to pick the grapes, and to clean them with care. In the south, where the wine is naturally generous, the stalks would add a disagreeable harshness to the liquor. They may be freed by a fork with three prongs, which the workman turns and agitates in the vat, and by being drawn up to the surface, are removed by the hand, or by a sieve of ozier twigs, distant from one another about half an inch, and having above it a close ozier pad or presser, about four inches thick."

It is more than probable, that the juice of the grapes of the U. States, will bear to have the stalks mixed with it, but it would always be best to make two parcels, one with the stalks, and another without.

" The 54th degree of FAHRENHEIT is generally considered the temperature most favourable to spirituous fermentation; below that degree it is languid, above, it becomes too great. Fermentation is slower, as the temperature has been colder at the time of collecting the grapes. In consequence, it has been recommended to place the vats in covered places; to remove them from damp and cold situations, to cover them, in order to moderate the cold of the atmosphere; to heat again the mass by introducing boiling must, and to make choice of a warm day for collecting the grapes, or to expose them to the sun.

" Must shut up in close vessels undergoes very slowly the phenomena of fermentation, and produces more generous wine, as the aroma and alkohol are retained, which are in part lost in fermentation in the open air. If the disengagement of the gas which escapes by fermentation, be checked by keeping the fermenting mass

in close vessels, the movement then slackens, and the fermentation terminates with difficulty and after a very long time.

"The activity of fermentation is proportioned to the mass; but it is not always of advantage to carry on the process in a large mass. Extremes must be avoided; and care must be taken not to obtain it with too great precipitation; the volume must be varied according to the nature of the wine and the object proposed. A small mass will preserve the *aroma*, a large mass developes the spirit. Ripe, sweet, and almost dry grapes produce a thick must, and fermentation is slow in commencing, and a great mass of liquid is required, otherwise the wine remains thick, and too luscious, and requires long keeping to perfect it.

"The temperature of the air, the state of the atmosphere, and the weather which prevails during the vintage; all these causes and their effects must be always present in the mind of the agriculturist, that he may be able to deduce from them rules proper for directing his conduct in regard to this object.

"When the must is very aqueous, (as in many seasons) boiling it is of advantage. *Drying* the grapes before fermentation is founded upon the same principle. Saccharine grapes require the addition of tartar, which must be boiled in a kettle with the must.

"The carbonic acid gas disengaged from the vintage, and its hurtful effects to respiration, have been known since fermentation itself was known. This gas, retained in the liquor by all means that can be opposed to its evaporation, contributes to preserve the aroma, and a portion of alkohol which exhales along with it. This carbonic acid holds in solution, a pretty considerable portion of alkohol.

"As the object and effect of spirituous fermentation, are merely the production of alkohol, by decomposing the saccharine principle, it thence follows that the formation of the one is always in proportion to the destruction of the other, and that the alkohol will be more abundant, as the saccharine principle is greater; for this reason, the quantity of alkohol may be augmented at pleasure by adding to the must the sugar which seems to be wanting.

"It must never be forgotten that the fermentation ought to be managed according to the nature of the grapes and agreeably to the wine that may be required. Weak wines must be fermented in casks, strong wines ought to be suffered to work in the vats.

"The period for taking the wine from the vats, ought to vary according to the climate, the season, and the nature of the wine proposed to be obtained, and of other circumstances, which must always be kept in view. In general the following consequences may be established:

"1. The must ought to remain in the vats the less time, according as it is less saccharine. Light wines, cannot bear the vat above from six to twelve hours.

"2. The must ought to remain the less time in the vats, according as it is proposed to retain the acid gas, and to form brisk wines; in that case, it is thought sufficient to tread the grapes, and to put the juice into the casks after it has been left in the vat 24 hours, and

sometimes without having been in the vat at all. In this case, the fermentation, on the one hand is less tumultuous; and on the other, the gas can with less ease be volatilized; which contributes to retain that highly volatile substance, and to make it one of the principles of the liquor.

"3. Must ought to be left in the vats less time, according as it is proposed to obtain wine less coloured. This condition is of great consequence in regard to brisk wines, one of the most valuable qualities of which is their want of colour.

"4. Must ought to remain in the vats less time, according as the temperature is warmer, and the mass more voluminous &c.; in that case, the briskness of the fermentation makes up for its shortness of duration.

"5. The must ought to remain in the vats less time, according as it is proposed to obtain wine of a more agreeable flavour.

"6. The fermentation, on the other hand, will be longer, according as the saccharine principle is more abundant, and the must thicker.

"7. It will be longer if the wines are destined for distillation; in which case, every thing ought to be sacrificed to the production of alcohol.

"8. The fermentation will be longer, according as the temperature has been colder when the grapes were collected, and according as the wine is required to be coloured.

"From these principles it may be conceived why in one country the fermentation in the vat terminates in 24 hours, while in others it continues for 12 or 15 days; why one method cannot be generally applied, and why particular processes may be attended with errors, &c.

"Gentil admits as an invariable sign of the necessity of removing the wine from the vat, the disappearance, in regard to taste, of the sweet and saccharine principle. This disappearance, he observes, is only apparent, but the savour of the little that remains is concealed; the alcohol, the savour of which predominates, terminates its decomposition in the casks..... It is also evident that this sign, which is not at all applicable to white wines, cannot be employed for wines destined to remain luscious."

It is highly probable that the important rule suggested by Gentil, would answer very well for the wines made from the native grapes of the middle United States. But the great point is to draw it off, before the feculent matter which rises in fermentation, falls down again.

"New casks destined for receiving wine, must be well impregnated with salt and water, to extract the injurious bitterness of the wood. Old casks must be well scoured and washed. The wine should be drawn from the vats into a reservoir and carried to the casks. The liquor which floats over the deposit of the vat, *(Surmout)* is to be drawn off and put into casks: it forms a lighter kind of wine, more delicate and less coloured. The head remaining after the wine is drawn off, will still yield wine, if pressed, but it must be separated, and pressed by itself, and it will produce good vinegar."

"Wine made from young vine-

yards is always thin and weak, and so are wines from old vineyards, when the seasons have been cold, stormy and wet. Assistance is given two ways, either by the help of some old strong wine, one fourth part at least, and four gallons of brandy to an English hogshead, or if that is not in your power, then half of the must is to be boiled away to one half of its quantity, that is, if one half of your must contains forty gallons, that must be boiled away to twenty, this greatly enriches it, and makes it of the consistence of liquid honey. As soon as it is cool, mix it with the rest of the must, and let it ferment together, and then manage it as before directed of other wines; when your vineyard comes to be ten or twelve years old, it will yield much stronger wines.

"The boiling of must is managed in the following manner, which must be carefully attended to; the copper or kettle being well cleaned, rub the inside all over with a woollen rag dipped in sweet oil, which preserves the wine from contracting a nauseous, copper or brass taste; then throw in the must, and kindle a gentle fire under the copper, with brush or small split wood; the copper standing so high, that the wood need not touch the bottom of it, when you put large wood under to make it boil fast; for if at any time your wood touches the bottom, the wine will be burned and spoiled. Gently raise your fire by slow degrees, stirring your must often from the bottom, and take off the scum as it rises, till all be clear; then raise your fire by larger wood, and make it boil faster and faster, as it settles down or boils away, till one half be consumed, being always careful, that none of the wood touches the bottom of the copper; the must thus boiled away is called defrutum, or the rob of grapes. If you neglect to raise the sediment from the bottom of the copper, it will burn and spoil the wine, for it turns bitter.

"All the vessels and instruments made use of must be perfectly clean and sweet; and every thing that has an offensive or disagreeable smell, must be removed from the place where wine is made, and *from the cellars where it is kept;* and the cellar ought to be dry and warm. It must also be free from mustiness, and in good weather, the windows next the south and west must be opened, to admit the warm dry air.

"Hogsheads well bound with iron are the only safe casks for wine; for, old wine pipes, or hogsheads with wooden hoops, constantly want repairing every year, but iron bound casks will hold many years, without any expense; I mean for standing casks, out of which the wine is racked into other casks for sale; but then as soon as they are empty, the lees must be taken out and saved for distilling into brandy; and the same day the cask must be filled with water, or else they will be destroyed by a small worm, which will pierce it like a sieve.

"Every man that has a vineyard should have a still and good worm, that he may distill all the lees, the husks and the scum into good brandy, which he will want for the preservation of his wines.

"I now pass on to the different management of wine after fermentation; one method I have already mentioned: some after the second

fermentation, leave the wine in the same cask upon the lees, and adding the old wine and brandy to it, (for which they make room) they stop up the bung hole, and leave only the vent hole open to let out the generated air, till the month of March, filling up the cask, from time to time, as the wine subsides or wastes, and then draw it off into a clean, well scented and well stummed cask, and stop all close with mortar.

"Others again in the month of March, before they rack it off and stum it, roll the cask backward and forward in the cellar to the wine thereby to communicate the strength of the lees to the wine, and then let it stand and settle till it is fine, and rack it off into clean, well stummed casks, and stop and plaister all up close."

Clarification of Wines.

The wine must be first drawn off from its lees in dry, cold weather. The pump used in Champagne is preferable, according to Chaptal, to every other mode of drawing off wine.

"To a leather pipe, of from four to six feet in length, and two inches in diameter, are adapted, at each end, wooden pipes, nine or ten inches in length, which decrease in diameter towards the ends, and are fixed to the leather pipe by means of a piece of packthread. The bung of the cask intended to be filled, is taken out, and one of the extremities of the pipe is put into it. A good cock is fixed, in the cask to be emptied, two or three inches from the bottom, and in this is inserted the other extremity of the pipe. By this mechanism alone, the half of the one cask is emptied into the other; for this purpose, nothing is necessary but to open the cock; and the remainder may be made to pass, by employing a pair of bellows two feet in length, comprehending the handles, and ten inches in breadth. The bellows force the air through a hole formed at the anterior part of the small end; a small leather valve, placed below the small hole, prevents the air from rushing out when the bellows are opened, and to the extremity of the bellows is adapted a perpendicular wooden pipe to convey the air downwards; this tube is fitted into the bung-hole, in such a manner, that when the bellows are worked, and the air forced out, a pressure is exercised on the wine, by which means it is obliged to issue from the one cask, and to ascend into the other. When a hissing is heard at the cock, it is speedily shut; this is a sign that all the wine has passed."

To clarify the wine thus drawn of., isinglass jelly mentioned under article Cyder, may be used, but in warm climates, Chaptal observes, "the use of this substance is dreaded, and its place is supplied by whites of eggs: ten or twelve are sufficient for half a muid, or 72 gallons English..... They should be well beaten up, and mixed with a pint of new milk."

"To revive claret injured by floating lees, two pounds of calcined flints, well pounded, ten eggs, and a large handful of salt, are beat up with two gallons of wine, which are then poured into the cask; two or three days after the wine is drawn off.

"Wire cellars must be dry some depth below ground; its apertures

ought to be directed towards the north; it must be at a distance from the street, highways, work-shops, sewers, necessaries, and ought to be arched at top."*

"From experiments," Mr. ANTIL says, "I am clearly of opinion, that the fæces or lees which are left in wine or cyder is the true cause of their frequent fermentation: it is from this idea of the thing, that I have all along so strongly insisted upon the removal of the lees in the beginning, upon the first as well as the second fermentation.

"I shall now propose the management of some small quantities, in different manners, by way of experiments, in order, if possible, to arrive at some tolerable perfection in this new undertaking.

"1st. Let a keg of four gallons be filled three-fourths with musk, that is, with the must and skins of black grapes, for making of red wine, (the skins having been well squeezed) before any fermentation; let the bung-hole be stopped close, and leave the vent-hole open, to let out the generated air, and after the second fermentation fill up the keg with old wine, and let the vent hole remain open, and let it stand so till February, then draw it off, and manage it as occasion shall require; if it be clear, sweet and good, bottle it; if you find it thin and weak, you must help it as in other cases.

"2d. Let a keg of four gallons be filled with the wine that is drawn off, after the first fermentation is over, the keg having first been well stummed, stop all close, and let it stand till February, if it then be fine, bottle it, if not, stum a second keg well, and draw it off, and stop all close, and let it stand till the next winter, if it then be fine, bottle it; if not, fine it down, and then bottle it for use: if, at the second racking, you find it thin and weak, add some brandy and old wine to it.

"3d. Let white grapes hang on the vine a month after the vintage is over, let others hang till they shrivel, make trial of these at different times; let them be mashed as much as possible without breaking the grape-stones; let them stand in the murk two, three, or four days, well covered with a blanket three or four double, then drain off the wine, and mash the skins very well over a cullender the second time; then strain out the stones, washing the skins very well with the wine, till all the pulp, that sticks to the inside of the skins, be got off, fill your keg with this wine three-fourths, and fill up the rest with good old wine; stop up the bung, leaving the vent-hole open till the second fermentation is over, then stop the vent-hole, and let it stand till February. I think this wine will be good; but then in all these cases the vent-hole, must now and then be just opened, to let out any generated air, lest the keg be in danger of bursting, as soon as the air puffs out stop it again, that as little air as possible, may get in."

"By varying these experiments, you may at last come at the most perfect way of making, fermenting, and preserving of wine."

American farmers have long been in the practice of making wines from our native grapes....

* These directions apply to red wines. For Madeira, Lisbon, Xeres (Sherry) and Teneriffe wines, the warmer the place in which they are kept, the better. *Editor.*

Some samples of these wines, the Editor has tasted, and found them very good. But in every case, except one, a large proportion of brown sugar was added, which gave the liquor a high colour, and a sweetish taste that detracted from the natural briskness of the liquor. This addition of the sugar is made to prevent the acetous fermentation taking place, but there can be no doubt, that the pure juice of the common blue or bunch grape (*Vitis sylvestris*) will make good wine, without sugar, if a small proportion of brandy be added to it, as is constantly done in all wine countries, even in Madeira. This opinion is strengthened by a fact lately communicated by a medical friend long resident in Chester county, viz. that the *Chicken grape*, or small blue grape, as the *Vitis sylvestris* is called, when preserved and eaten freely in pies in winter will slightly inebriate. This fact is very important.

Mr. B. WARING of Columbia, S. Carolina, lately sent a bottle of wine to Philadelphia, made from grapes of his own raising, without sugar, which resembled a fine *Sauterne* wine, in colour and taste; and he informed the Editor, that he added only one gallon of brandy to every twelve of juice....See WINE.]

VINE, the Wild. See BRYONY, the white.

VINE-FRETTER. See PLANT-LOUSE.

VINEGAR, an agreeable pungent acid, which is obtained from wine, cyder, beer, or other fermented liquors.

[The principal requisites to form good vinegar, according to PARMENTIER, (*Cours D'Agric.* tom. x.) are, 1. Contact with the air; 2. A temperature not exceeding 20° of REAUMUR (77 of FAHRENHEIT); 3. The addition of some extraneous vegetable matter to promote the acetous femention; and 4. The presence of *alkohol*. This last requisite has not been generally known in the United States; its importance, however, was discovered by Col. ANDERSON, now of New-York, several years before PARMENTIER wrote, and he has since been in the practice of adding some cyder spirit, to make cyder vinegar, during the progress of the acetous fermentation.

"The inhabitants of the cyder and perry cantons," says PARMENTIER, "make vinegar of these two liquors, thus; in a cask of 800 pints, they mix six pounds of sour (*aigre*) yeast, (made with leaven and rye-flour,) with hot water, and pour it in the cask; after agitating the whole with a stick, they let it remain, and in six or eight days, vinegar of good strength is produced. It is very necessary to draw off this vinegar as soon as done, because it is more subject to become vapid than wine-vinegar.... The bung must be kept close."

Mr. JOSEPH COOPER, of New-Jersey, makes his vinegar of good bodied cyder, fills the barrel one-third full, and permits it to stand with the bung-holes slightly covered for at least nine months. If the fermentation does not proceed with sufficient rapidity, he draws off a few quarts of the liquor, and after boiling and skimming it, returns it again into the cask. Mr. COOPER confirms the utility of the practice of adding cyder or rye-spirit to weak vinegar to increase its strength.

Mr. WILLIAM SHEAFF, of Phi-

ladelphia, adds one quart of bruised and ripe sumach-berries, after being boiled with half an ounce of creme of tartar, to every barrel of cyder destined for vinegar. He fines it, by pouring in one quart of fresh blood, beaten up with a handful of salt.

To prevent a mould forming on vinegar, several methods have been proposed. 1. To prepare vinegar very strong and sour. 2. To concentrate the vinegar by freezing, after which a hole is made in the crust of ice which covers it, through which the part not congealed is let out, and afterwards may be bottled. By this process, more than one half is lost. [Very weak vinegar that will not keep is best treated in this last manner.] 3. To fill the bottles and keep them well corked. 4. To distill the vinegar in a *glass* retort. The following is the easiest method.

Boil vinegar in a *well tinned* kettle for a quarter of an hour, and bottle it, or fill the bottles with vinegar, and put them into a kettle full of water upon the fire. After the water has boiled for an hour, the bottles are taken out of the pot, and corked. Vinegar thus boiled will keep for several years without growing turbid or mouldy...... SCHEELE's *Chemical Essays*.]

Wine-vinegar :....Let any quantity of vinous liquor be mixed with its own lees or fæces, or with the acid and austere stalks of the vegetable from which wine was prepared. The whole must be frequently stirred, and either exposed to the sun, or deposited in a warm place: after standing a few days, it will ferment, become sour; and, in a fortnight, it will be converted into vinegar.....Such is the usual manner of producing this acid; which is frequently rectified by distillation, when it is known under the name of distilled vinegar.

Cyder-vinegar, may be made by fermenting new cyder with the *must* of apples, in a warm room, or in the open air, where it should be exposed to the sun; and, in the course of a week or nine days, it will be fit for use.

Another method of preparing vinegar, is that published by M. HEBER: it consists in exposing a mixture of 72 parts of water, and four of rectified malt-spirit, in a temperature of from 70 to 80° of FAHRENHEIT, for about 2 months; at the expiration of which the acetous process will be completed.... A cheaper, though more tedious mode, is that of dissolving 2 lbs. of molasses in nine quarts of boiling water: this solution must be poured into a vessel containing a large quantity of cowslips; and, when the mixture becomes cool, a gill of yeast should be added. The whole is then to be exposed to the rays of the sun: at the end of three months, it may be bottled for use, and will be of peculiar service in pickling.

Tarragon-vinegar is manufactured, by infusing one pound of the leaves of that vegetable (which have been gathered a short time before it flowers) in one gallon of the best vinegar, for the space of 14 days; when it should be strained through a flannel bag; and a dram of isinglass, dissolved in cyder, must then be added; the whole be carefully mixed, and decanted into bottles for a month. Thus, the liquor will acquire a most exquisite flavour; it will become remarkably fine, and almost colourless..... [See ARTEMESIA.]

There is a method of procuring a very powerful *essence of vinegar*;

which, however, can be practised only during the intense frosts of winter: it simply consists in exposing this liquor in basons, or other shallow vessels, when the watery parts are converted into ice; but the spirituous, or acetous basis, remains in a fluid state; so that, by repeated exposure, one pint of strong vinegar will in very cold seasons, be reduced to about a table-spoonful of the essence. This preparation possesses a fine flavour, and a pungent, almost corrosive taste: hence it forms an excellent spice or sauce to fish in general, but particularly to lobsters and oysters.

VIOLET, or *Viola*, L. a genus of plants, consisting of 44 species; of which the following are the principal:

1. The *canina*. See Dog's Violet.

2. The *tricolor*. See Heart's-ease.

3. The *odorata*, or Sweet Violet, is perennial; grows in warm lanes, hedges, and ditch-banks, especially in clayey or marly soils: flowers in the months of April and May...Both the blossoms and seeds of this plant are mildly laxative; and, when taken in doses of from 40 to 80 grains, the powdered root operates as a purgative, and likewise as an emetic....Large quantities of violets are cultivated at Stratford-upon-Avon, for their petals, to impart the colour to *syrup of violets*; an officinal preparation of which is kept in the shops, and proves an agreeable and useful laxative for children. Such syrup may also be employed in many chemical inquiries, for discovering the presence of an *acid*, or an *alkali*; the former changing the blue colour to a red, and the latter to a green: though slips of white paper, stained with this juice, and preserved from the access of air and light, may serve as a substitute for that purpose.

VIPER's BUGLOSS, the Common, or *Echium vulgare*, L. an indigenous biennial, growing in sandy corn-fields, walls, and rubbish, particularly on the clay thrown out of coal-mines: it flowers from June till August....This vegetable is not relished by cows, and is refused by horses and goats; but its strong hairy flowers are fondly visited by bees....From the flower-stalks, Dambourney obtained a dye of a fine olive-green shade.

Virgin's-bower. See Traveller's-joy.

VITRIOL, a compound salt, formed by the combination of zinc, copper, or iron, with the sulphuric, or vitriolic acid; and which is either white, blue, or green, according to the metal employed.

White Vitriol, or Vitriol of Zinc, is found in the mines of Goslar, in Saxony, in a native state, and consists of white transparent pieces; but, the quantity thus obtained being insufficient for the demand, this salt is generally prepared by mixing 5 parts of sulphuric acid with 20 of distilled water, and gradually adding 3 parts of zinc; when the ebullition ceases, the liquor is strained; and, after being evaporated, it is deposited in a cool place, where it shoots into white crystals. It is sometimes employed by painters, for the purpose of speedily drying oil-colours: its taste is nauseous, though sweetish; being frequently given as an emetic, in doses of from 5 to 6 grains to half a dram; the operation of which is very powerful; and such drug ought therefore to be regular-

ly *prescribed*. But its chief utility is that of an astringent and desiccative, in external applications: thus, when dissolved in the proportion of 16 grains in 8 oz. of water, with the addition of 16 drops of weak vitriolic acid, it forms an useful *collyrium*, or eye-water. A solution of 2 drams of white vitriol, and a similar quantity of alum, in a pint of water, is likewise employed for cleansing foul ulcers, and repelling cutaneous eruptions.

Green Vitriol consists of sulphuric acid diluted with 10 or 12 times its weight of water, in which iron-filings are dissolved: when the effervescence ceases, the mixture is for some time placed in a sand-bath; next, the liquor is strained through paper; and, after being evaporated, it shoots into rhomboidal crystals, which are also termed *Salt of Steel*.....Green vitriol is given in doses of from half a grain to 5 grains; according to the age, strength, or case of the patient; being one of the safest forms in which iron can be administered. See vol. iii. p. 390.

Blue Vitriol, is chiefly imported from Italy. It is made by stratifying plates of copper with sulphur; and, on slow combustion, the sulphuric acid corrodes the copper: the metal is then boiled in water, till the saline particles are dissolved; when, after repeated solution, and subsequent evaporation, the whole is reduced to the chrystallizing point. Vitriol of copper is chiefly employed externally as a caustic, to remove the flesh of fungous ulcers; for which purpose it is very useful: on account of its virulent properties, however, it ought never to be administered internally, without medical advice.

VITRIOLIC ACID, SULPHURIC ACID, or OIL OF VITRIOL, an useful liquid, prepared by the combustion of sulphur in close vessels, with the addition of 1-8th or 1-12th part of nitre, and a little water, to condense the vapour: after which it is concentrated and purified by evaporation. Beside the purposes to which it may be applied (and which are stated in the articles BLEACHING and SULPHUR), this acid, when properly diluted, has successfully been administered in hemorrhages, fevers of the typhus kind, and the itch; in doses of from 40 to 60 drops in water; but, when combined in the proportion of one part, with eight of lard, or other unctuous matter, it forms an efficacious application to the parts affected, in chronic cutaneous eruptions, and likewise as a *rubefacient* in rheumatisms and local palsies.

VIVES, in farriery, a disorder affecting horses, and which differs from the strangles only in this respect, that the tumors in the former do not suppurate; and may therefore be dispersed by covering the diseased animal with blankets; by rubbing the tumefied part with the ointment of marsh-mallow; by moderate blood-letting, when a plethoric habit requires it; and giving one or two gentle purgatives. But, if these remedies fail to remove the inflammation, it will be necessary to promote a suppuration, and to adopt the treatment stated in the article STRANGLES.

Vives appearing in old horses, indicate an internal decay, which no medicines can remove; or are symptomatic of the GLANDERS: in the latter case, the animals must be treated in the manner pointed out vol. iii. p. 158.

ULCER, is an ichorous or purulent solution of soft parts. This affection may arise from a variety of causes, such as cancer, scrophula, scurvy, &c. but, as a discussion of these would exceed our limits, we shall only give an outline of the general treatment.

[Ulcers, and particularly those which appear in the legs, have hitherto been too generally abandoned to the care of quacks, "either," says Dr. Rush, "because the disease was considered as beneath the notice of physicians, or because they were unable to cure it." The same excellent physician very justly ascribes the difficulty of curing sore legs, to the indiscriminate mode of treating them, occasioned by a want of theory which shall explain their proximate cause. He is of opinion, that sore legs are a disease of the whole system: this he infers from the causes which induce them, acting more or less upon every part of the body; from their following or preceding diseases, which obviously belong to the whole system, as fevers and dysenteries; from their becoming in some cases the outlets of obstructed female discharges; from the symptoms of sore legs, which are often febrile; and lastly, from the remedies which cure them, acting more or less upon the whole system. These propositions he supports, by details in an excellent paper on the subject, in the 2d vol. of his works. Dr. Rush with great propriety, divides the remedies to cure the complaint, into such as are proper where the arterial system is affected by too much tone: these are,

1. *Blood-letting*. The efficacy of this remedy in disposing ulcers to heal, he exhibited in the Pennsylvania hospital; and he acknowleges to have learned the use of the remedy from the late Sir John Pringle. The Editor can add his testimony in favour of its efficacy.

2. *Gentle purges*. 3. *Nitre*.... From 15 to 20 grains may be given three times a day. 4. A temperate diet, and total abstinence from fermented and spirituous liquors.

This remedy (for such temperance may be) is of the greatest importance when ulcers affect the labouring class, among whom this very commonly prevails, and with great obstinacy. It is utterly impossible to effect a cure so long as they indulge in daily potations of *liquid fire*, which keeps the system in a constant fever and irritation. They must be abandoned not gradually, but at *once*, if a cure be expected.

The local remedies in this state of the system should be,

1. "Cold water."....Of the efficacy of this remedy, when applied in a particular way, the Editor has heard the following well attested case:

A man who had long been afflicted, was effectually cured by holding his sore leg against a small stream for ten or fifteen minutes, every day for a few weeks.

2. "Soft poultices of bread and milk.".....Dr. Underwood in his *Treatise on Ulcers*, directs them to be made thus. Finely grated bread; moderately stale, is to be sprinkled into boiling milk, with one hand, whilst it is kept, stirring with the other. The difficulty with which the spoon is moved, will shew when a proper quantity of bread is put in; after which it should remain on the fire not more than two or three minutes

at most, and is to be turned out boiling; by which means the bottom will retain its heat, after its surface is become cool enough to allow of its application. It should be spread upon a piece of double linen cloth, by the help of a round edged knife, greased with hog's lard or oil, to the size required. These directions are given, because every physician who has occasion to prescribe a poultice, knows how seldom it is properly made.

3. "Rest, and a horizontal posture of the leg." Too much cannot be said in favour of this remedy of sore legs.

Where the inflammation is considerable, rest is indispensably necessary; and many ulcers which were trifling in the beginning have become very tedious, owing to the irritation from working, walking, or riding.

In sore legs, attended by too little general and local action, Dr. Rush advises,

1. *Bark* in large doses, but with a constant reference to the state of the system, which may render its disuse for a short time frequently necessary.

2. *Mercury*. It acts as a universal stimulant, and should be given to salivation.

3. *Exercise*. 4. A nutritious and moderately stimulating diet. *Wort* has done great service in sore legs. The manner in which he directs it to be prepared and taken is as follows:

To three or four heaped table spoonfuls of malt finely powdered and sifted, add two table spoonfuls of brown sugar, and three or four of Madeira, Sherry, or Lisbon wine, and a quart of boiling water. After they have stood a few hours, it may be drank liberally by the patient, stirring it each time before he takes it, so that the whole substance of the malt may be conveyed into the stomach. A little lime-juice may be added, to make it more pleasant. The above quantity may be taken once, twice, or three times a day at the pleasure of the patient, or according to the indication of his disorder.

5. *Opium* eases pain, and co-operates with the other remedies in invigorating the whole system.

The *local* applications should consist of gentle *escoratic* remedies, which excite an action in the torpid vessels of the affected part. Arsenic, red precipitate, and blue vitriol, have all been employed with success for this purpose..... Dr. Griffiths employs *tartar emetic* with success. They should all be used, if necessary, in succession to each other. After the use of these remedies, astringents and tonics should be applied, such as an infusion of Peruvian, or white oak bark, the water in which the smiths extinguish their irons, lime-water, bread dipped in a weak solution of green vitriol, (so much commended by Dr. Underwood), and compresses wetted with brandy, or spirits.

"Tight bandages are likewise proper here." Dr. Underwood prefers a roller of *Welsh flannel*, cut a ross, and sewed together selvage ways (the hard selvage thread being first cut off) whereby the roller is made to yield to every motion, and varying shape of the limb, and admits of, and assists the patient in walking..... "The bandage should be four inches wide, and ought to be carried from the extremity of the foot,

till it rises to the calf of the leg." In summer a cotton roller will be more proper.

"It is of the utmost consequence in the treatment of sore legs, to keep them clean, by frequent dressings and washings."

The following remarks on the treatment of ulcers, are communicated by Dr. James Hutchinson, house pupil of the Pennsylvania hospital, whose experience has been very extensive in the disease.

"The patients afflicted with this complaint when first visited, were generally found to have their ulcers considerably inflamed, sloughing, and discharging an offensive matter. The remedies most successful, when they put on this appearance, are low diet, confinement to bed, and emollient poultices, of bread and milk, or flax-seed; after submitting to these remedies for a few days, the surface of the ulcer will become clean and red, and the granulations will begin to rise. In this stage the cure can be greatly expedited, by approximating the edges of the ulcer with stripes of sticking plaster, spread on linen or leather, and then covering the whole with a plaster of simple cerate; a bandage is afterwards to be applied, extending from the toes to the knee, in such a manner as to press equally on all parts. These dressings are to be renewed every 24 hours. When the patient's business compels him to take exercise, this method is absolutely necessary for the cure of an ulcer. If the granulations should rise so high as to be above the level of the surrounding skin, they are to be kept under by touching them with lunar caustic. It often happens that after the ulcer becomes clean, it shews no disposition to fill up, and has an indolent appearance, dressing it with red precipitate ointment, will generally cause the granulations to rise and thereby fill it up.

When the ulcer is completely healed, a bandage ought to be worn for several weeks after, together with a piece of sheet lead over the part where the ulcer existed, to defend it from accidents."]

A new and ingenious method of treating old ulcers of the legs, has lately been recommended by Mr. Baynton, of Bristol; and which has since been succesfully adopted by many respectable surgeons. It consists in carefully drawing the skin that surrounds the ulcer, towards its centre; and which is gradually effected at each dressing, by the aid of slips of adhesive plaster (for instance, that of diachylon, or lytharge), spread on smooth linen cloth. These slips must be made 2 inches broad, and of such a length that, after passing round the limb, from 4 to 5 inches may remain: the middle of this piece is to be applied to the sound side of the limb, opposite to the inferior part of the ulcer, about one inch below the lower edge of the sore, and the ends are drawn over the ulcer with as much gradual extension as the patient can bear. Other strips are then to be placed in a similar manner, each above and in contact with the other, until the whole surface of the sore and limb be completely covered, at least one inch below, and two or three inches above, the diseased part. Next, the limb is to be defended by rollers of soft calico, passed round as smoothly as possible, above and below the ulcer. In cases of violent inflamma-

tion, and considerable discharge, Mr. B. recommends repeated affusions of cold water: the patient should take frequent exercise, and apply this bandage early in the morning; as the limb is then less liable to swelling. In a short time, the pain, which at first is considerable, will be found gradually to abate, while the limb recovers its tone and sensibility.

VOMITING, is the inverted vermicular motion of the muscular fibres of the stomach and intestines; being attended with convulsions of the abdominal muscles and midriff: when this action is so mild as to be confined to the stomach, it is then termed nausea.... As vomiting is a frequent symptom in other diseases, especially in fevers, we shall here consider it only as a primary complaint.

Causes:...Crudities accumulated in the stomach; such as bile; mucus; hard, indigestible food; scirrhus, and other organic affections; acrid and poisonous substances taken by the mouth; worms; ruptures; nephritic complaints, or stone, as well as violent passions.

Cure:...If the stomach be foul; or if hurtful substances have been swallowed, emetics should be administered in the manner described, vol. ii. p. 451; but, in cases where poisons have been taken, the antidotes recommended under their respective heads, should first be resorted to; and the cure be completed by strengthening medicines. In callosity, or scirrhosity of the stomach, benefit has often been derived from the internal use of soap, mercurials, and other alteratives....Worms require the treatment already suggested, for their expulsion....If vomiting has been induced by violent passions, especially by anger and vexation; it will be advisable to take a tea-spoonful of vitriolated kali in spring water, and, on the following morning from 10 or 15 grains of powder of rhubarb: the beverage should consist of barley-water, and other diluents, with cream of tartar, and a few grains of nitre. Persons of an irritable temper, and consequently more liable to a return of this complaint, ought at least to abstain from spirituous liquors, and high-seasoned food.

Where the vomiting, or nausea, continues after the stomach is cleansed, about a scruple of salt of wormwood should be taken in water; and immediately after, two tea-spoonfuls of lemon-juice in the same liquid; which remedy may be repeated every two or three hours; drinking balm-tea in the intervals. The Columbo-root has, likewise, been of great service in these cases.

Infants at the breast are often troubled with vomiting: if the milk be coagulated, and the stools have a similar appearance, or a green colour, and an acid odour, the testaceous powder should be given, as directed, p. 99 of this vol. after which the infant ought to drink pure whey; but, during the attack, luke-warm water must be administered; farther, a mixture of sweet-oil and laudanum may be rubbed in, or warm cushions filled with aromatic plants, be applied to the pit of the stomach. If such vomiting be followed by great debility, a few tea-spoonfuls of mulled red-wine, with a little nutmeg, may be allowed with benefit; though this practice should never be adopted on trivial occasions.

URINE, is that part of the blood which is separated by the extremi-

ties of the arteries connected with the kidnies. It drops by the ureter into the urinary bladder, where it usually remains a few hours; and is prevented from returning into the ureters, by their entrance being oblique, and provided with valves.

As this secretion is of importance in the animal economy, we shall give a concise view of the principal diseases arising from that source. It deserves to be previously stated, that the obstruction of the urinary passage is always attended with greater and more immediate danger, than that of the bowels....When the inclination to make water is succeeded by a discharge of a few drops only, it is termed a *strangury;* if the difficulty of voiding it be attended with pain, a *dysury;* and a total suppression, is called *ischury.*

Causes:....The most frequent are, an acrid state of the blood; spasms; compression of the neighbouring parts; scirrhous, or cancerous tumors forming internally; suppressed perspiration; repulsion of rheumatism, gout, and cutaneous eruptions; stone in the bladder or kidnies; inflammation of the bladder, &c.

Cure:......In urinary affections arising from acrimony, suppressed perspiration, or spasms, it will be advisable to take antispasmodics, combined with mild sudorifics; for instance, emulsions with tincture of guaiacum; camphor, &c. at the same time, warm fomentations should be applied to the lower belly; or, tepid bathing, followed by emollient clysters, may be of still greater advantage. If the disorder originate from a repulsion of rheumatic, gouty, and other morbid matter, attempts must be made to reduce the affection to its former seat, by means of diaphoretics; blisters applied to different parts, and the use of warm baths. In cases of inflammation of the bladder, or stone, we refer the reader to vol. i. p. 295; and p. 47 of the present volume.

In every stage of these painful maladies, the patient should take lukewarm, mucilaginous liquids; such as solutions of gum-arabic in water; or linseed-tea; and a bland, nutritious diet. If, however, the desired relief be not speedily obtained, proper medical aid ought to be procured, without delay.

Sometimes the urine is involuntarily emitted, but without pain; a complaint which frequently affects children. It generally originates from indolence; so that moderate correction will prove the most certain remedy: it may, however, also arise from a weakness of the sphincter of the bladder; in which case, tonics, such as bark, valerian, &c. together with blisters applied to the loins, or to the sacral bone, will be the most proper means. But, where it proceeds from worms, anthelmintics may be employed with advantage.

Another affection of the urinary system, is *diabetes*, or an immoderate and long-continued discharge of urine, the quality of which is, in most cases, preternaturally changed: thus, in some instances, it has the smell, colour, and taste of honey; while, in others, it is entirely limpid.....It is a remarkable circumstance in this affection, that the excretion of urine exceeds the quantity of liquid taken by the patient.

Causes:...Spasms; general debility, or local weakness in the kid-

nies; strong diuretics, and whatever may induce a laxity of the body......This malady is seldom cured, unless it be attended to in its earlier stages.

Treatment:....The remedies hitherto prescribed for this affection, are tonics, such as bark, with small doses of rhubarb, or mixed with the diluted vitriolic acid; and the daily use of mucilaginous drinks, conjoined with lime-water, either alone, or with milk. But the most important point appears to be, *abstinence from all vegetable food*; a practice which has been attended with the best effect. [See DIABETES.]

Lastly, there occurs sometimes an alarming affection of the bladder, when the urine is mingled with blood....If this malady be suffered to continue for a long period, it may prove fatal; but, in general, it is not attended with danger.

Causes:....Violent exertions and local injury; inflammation of the kidnies; drastic and diuretic medicines; excess in sensual pleasures; suppression of the piles, &c.

Cures:...When the disorder arises from debility, tonics, combined with astringents, should be employed. If acrid matters produced such bloody discharge, it will be necessary to resort to mucilaginous substances and antispasmodics; such as chamomile, rue, opium, &c. but, when it is occasioned by suppressed evacuations, these ought, if possible, to be speedily restored.... Where the passage is ulcerated, it will be useful to take the Peruvian bark with sal ammoniac, or lime-water and milk. In cases of STONE, the reader will find the proper remedies stated under that article.

USQUEBAUGH, a strong, compound, spirituous liquor, which is prepared in the following manner:

Take of cloves, cinnamon, and nutmegs, each 2 oz.; of caraway, anise, and coriander-seeds, each 4 oz.; and half a pound of liquorice-root, cut in slices. Let these ingredients be bruised, and distilled with 11 gallons of proof-spirit, and two gallons of water, till the *faints* begin to rise. When the liquor is about to *run*, 2 oz. of British saffron, tied in a linen bag, should be fixed to the extremity of the worm, so that the spirit may filtre through and extract all the virtues of the saffron. When the distillation is completed, the whole should be sweetened with a sufficient quantity of double-refined sugar, and decanted for use.

Usquebaugh is chiefly employed as a *cordial*, and may occasionally be drunk with advantage, by persons who have undergone great bodily fatigue; but, as the possession of such *luscious* beverage is apt to introduce detestable habits, we conceive, that diluted rum, or other simple spirit, would afford a proper substitute for this expensive compound.

USURY. See INTEREST.

UVULA, in animal economy, denotes a soft glandular body, of a conical figure, that is suspended from the palate, or posterior part of the roof of the mouth, perpendicularly over the chink of the windpipe, which lies at the root of the tongue.

The *uvula* is by Nature designed to modify the current of cold air, previously to its entering the lungs. As the affections, to which this part is exposed, do not essentially differ from those of the TONSILS, we shall conclude with remarking, that a gargle, consisting of a decoction of Peruvian bark,

sage, rose-leaves, or other astringents, has generally proved efficacious, in cases where this useful gland is so relaxed or inflamed, as to be attended with a difficulty of swallowing.

W.

Wages. See Labour.

WAGGON, a species of wheel-carriage, the form of which varies, according to the different purposes for which it is designed.

Few implements of husbandry are of greater importance, or admit, perhaps, of more essential improvements, than wheel-carriages. Hence we cannot but express our surprize at the infatuation of those farmers, who employ large waggons, on the erroneous principle, that a greater quantity may thus be carried at one time; while they overlook the injury which such unwieldy machines necessarily occasions, both in their fields, and particularly on roads, by making deep ruts, and otherwise tearing or breaking up the soil. The principal objection to the use of these heavy vehicles on farms, is their *weight*; which requires an increased number of horses or cattle, that might be more profitably employed in tillage. The same observation is applicable to the common *road* or *stage-waggons*: these usually weigh about $2\frac{1}{2}$ tons, and are drawn by 8, 10, or more horses, according to the distance to which they travel. Now, a single horse, of a moderate size will, in a well-constructed vehicle, and on tolerable roads draw 30 cwt. with ease, independently of the weight occasioned by the cart: and it will perform this task for a series of days, months, and even years. But, if the common waggons were laden according to such draught, they ought to carry from 20 to 40 tons; a weight exceeding their strength, and incompatible with their mode of construction. The superiority of small carriages being too evident to require any farther demonstration, we shall subjoin a table, exhibiting the load which waggons and carts are, by act of parliament, permitted to draw on the turnpike-roads; and which includes both the whole incumbent load, and the vehicle itself.

	Summer Weight. tons. cwt. qrs.	Winter Weight. tons. cwt. qrs.
Waggons, with wheels not exceeding 9 inches,	6 0 0	5 10 0
Ditto, with wheels not exceeding 6 inches,	4 5 0	3 15 0
Ditto, with wheels not exceeding 3 inches,	3 10 0	3 0 0
Carts, with wheels not exceeding 9 inches,	3 0 0	2 15 0
Ditto, with wheels not exceeding 6 inches,	2 12 0	2 7 0
Ditto, with wheels not exceeding 3 inches,	1 10 0	1 7 0

Our limits not admitting a farther disquisition, we request those readers, who wish to obtain additional information on this subject, to consult Dr. ANDERSON'S "*Dissertation on the Means of Constructing Waggons, and other Carriages employed for the Purposes of Agriculture;*" an ingenious essay, which is inserted in the 4th vol. of his "*Recreations in Agriculture*," &c. See also the article CART.

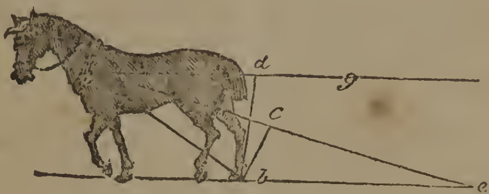
[The above table is preserved, from an opinion that the English regulations may be advantageously adopted in the United States, where it is highly pleasing to see a spirit prevailing in favour of those great sourses of riches to a country, TURNPIKE ROADS.

The great importance of enabling a horse or ox to draw with the greatest power, is self-evident; and hence the reader is presented with the following observations, by Mr. WALKER, extracted from his "*Lectures on Philosophy*," 4to.

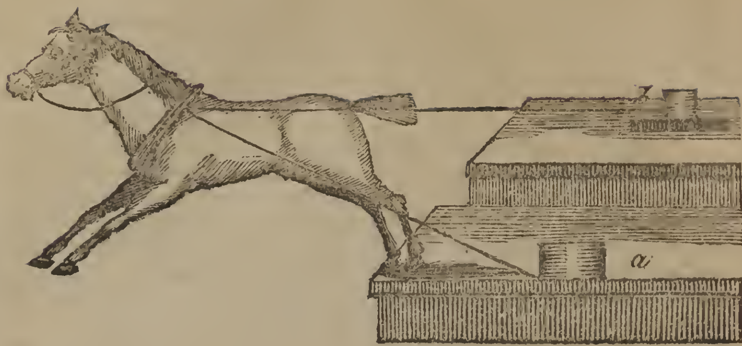
It is evident, that where the neck rises from the chest of the horse, the shoulder-blades form the resting place of his collar, or harness, into a *slope* or *inclination*; and as this slope forms an angle, with a perpendicular to the horizon, of about 14 or 15 degrees, it is evident, the line of his draught should form the same angle with the horizon, because he will then pull perpendicularly to the shape of his shoulder, and all parts of that shoulder will be equally pressed by the collar. The following figure may render this more intelligible, and show that a horse draws more conformably to his mechanism in a sloping, than an horizontal line.

The horse himself, considered as a lever, has in this inclined draught a manifest advantage over his obstacles, in comparison of an horizontal draught, as may be seen by the next figure.

When a horse is yoked to a post, or has any great obstacle to overcome, he converts himself into a lever, making his hind feet the fulcrum, and the centre of gravity of his body to lean over it, at as great a distance as possible, by thursting out his hind feet; by this means acting both by his weight and muscular strength, and lengthening the acting part of the lever *a b*, he overcomes the difficulty more by his weight than by his muscular strength; for the muscles of the fore legs act upon the bones to so great a mechanical disadvantage, that though he exerts them with all his might, they serve in great difficulties, for little more than props to the fore part of his body. Hence we see the great use of heavy horses for draught.



But the great mechanical advantage of the inclined draught, may be more particularly seen, by calling the line *a b* the acting part of a lever, and the nearest approach from the fulcrum *b* to the inclined line of draught, (that is, *b c*) the resisting part of the lever; compare this with the resisting part of a lever, touching the horizontal line of draught, (that is, *b d*) and it will be found nearly double; consequently, agreeably to the known properties of the lever, a weight at *g* would require double the exertion in the horse to remove it, that the same weight would require was it placed at *e*. These advantages, great as they are, are yet so obvious, that one wonders how they could be overlooked. Let any one with the model of a horse from a toy-shop, set his hind feet on the edge of a table, and it will be found that he will draw double the weight along the table *a*, that he can upon the table *b*.



The obvious conclusions from this experiment is, that single horse carts are preferable to teams; that four horses, with each a properly constructed cart, will draw much more, and with more ease to themselves, than when they are yoked in a team to one cart; because, in that case, three of the horses must draw horizontally, and consequently in a manner inconsistent with their mechanism, and the established laws of mechanics. The horse's collar is also drawn against his throat, by which his breathing is interrupted; and in cart teams, (where the horses are not marshalled, as in waggons,) one horse is standing still, perhaps, while another is wasting his strength in pulling him forward.... One horse to relieve himself, leans on one way out of the line of draught, whilst another is leaning a contrary way; in short their strength is seldom united.

From a number of experiments made by Mr. Walker, for the purpose of determining the proper draught, there appeared, to be an evident disadvantage in drawing from above the centre; and on the contrary, a considerable increase of power in drawing from the axles. Hence he concludes as the splinter bar, or point of draught, in most carriages, is placed about one fourth the diameter of the fore wheel above its centre, it is evident, that a pressure equal to one fifth of whatever weight lies upon it, is actually added to the natural weight, by this situation of the point of draught. For 24oz. surmounted the obstacle when the pull was from the centre, and 30oz. were required to surmount it, at half the length of a spoke above the centre.

From Mr. Walker's experiments to ascertain the best proportions between the heights of the fore and hind wheels; it appeared, that there was little superiority or inferiority in all the variety of combinations of heights in fore and hind wheels. Fore wheels, however, of four feet eight inches, and hind wheels of five feet six inches, seem to have what little advantage there is. To the objection which might be made against these dimensions, founded upon the inconveniences arising to the coach-

maker in altering the routine of his business, he replies it is certainly as easy to fix the splinter-bar under the futchells, as upon them; and I see no great outrage that would be done to appearance and fashion, if the buttons on which the traces are looped, were *under* the splinter-bar instead of being a-top. In these cases the draught would have all its mechanical advantages, and the horses would draw agreeably to their form and anatomy; the pole would have the same command of the carriage down hill, and the same command in turning as in the present method.]

WAINSCOT, denotes the timber-work employed for lining the walls of apartments: it is usually made in the form of pannels, and painted, in order to serve as a substitute for hangings.

According to the modern practice of building, rooms are *wainscoted* only to the height of two or three feet; the intermediate space, to the ceiling, being usually covered with paper. The walls, however, ought to be thoroughly dry, before the wainscot is fixed; as the moisture exuding from the bricks is apt to loosen the pannels, and thus disfigure the workmanship. With a view to prevent such accidents, charcoal and wool are usually placed between the timber and the wall; but the most certain method of preserving the wainscot, consists in *priming* the inner sides of the joints with white lead, or with a mixture of Spanish-brown and linseed oil.

WAKE-ROBIN. Cuckow-pint, or Lords and Ladies, *Arum maculatum*, L. a native and hardy perennial, growing in shady places, ditch-banks, and rough grounds; flowering in May and June.

Both the bulbous root, and the leaves of this vegetable, in a fresh state, are extremely acrid. Nevertheless, the former has sometimes been used internally as a powerful stimulant, and externally as a substitute for blisters. When dried and pulverized, these roots lose all their acrimony, and afford an almost tasteless farinaceous powder. According to Dr. Withering, good *bread* may be prepared from them, as well as an excellent *starch*. .....The French manufacture from the same root, when properly dried and reduced to powder, a harmless *cosmetic*; which is sold under the name of *cypress-powder*. Such preparation may also, and, we conceive, with greater advantage be used in domestic economy, instead of *soap*.

Wall. See Building.

Wall-barley. See Barley.

WALL-CRESS, the Common, or Codded Mouse-ear, *Arabis thaliana*, L. an indigenous plant, growing on walls, roofs, and in dry, sandy pastures: it flowers in the month of May.....The Wall-cress seldom exceeds the height of 4 or 5 inches; it produces small white blossoms, which are succeeded by long slender pods, containing minute round seeds....This plant is said not to be relished by sheep, and is wholly refused by hogs; but we are informed by Bechstein, that sheep are so remarkably partial to the Codded Mouse-ear, as "to run after it."

Wall-pepper. See Pepper-Stone-crop.

Wall-worth. See Dwarf-Elder.

WALNUT-TREE, or *Juglans*,

L. a genus of exotic trees comprehending 8 species; the principal of which is the *regia*, or Common Walnut-tree. It is originally a native of Persia, and attains, in this country, the height of from 50 to 60 feet; having a beautiful erect trunk, that branches out into a large spreading crown, which is furnished with pinnated leaves..... There are numerous varieties, generally raised for their palatable fruit, which ripens from the beginning of September till the end of October; but the most esteemed are the Double Walnut, the Large Walnut, the French Walnut, the Thin-skinned, and the Late Walnut.

The Common Walnut-tree is propagated by drilling the ripe, dry nuts, together with their external rind, at the distance of one inch from each other, and in rows nine inches asunder, in a light garden soil, that has been well ploughed or trenched. If the autumn be dry, they may be sown in that season; in the contrary case, the nuts must be preserved in dry sand till the month of February, or early in March, when they may be set in the manner above directed. In the succeeding winter, it will be advisable to shelter the nuts either with rotten dung, decayed leaves, or with tanner's waste, over which flat stones or slates may be placed, till they begin to shoot, when such covering will become useless. Should the ensuing summer prove dry, it will be proper to water the young plants; and those in a prosperous condition may be removed in autumn, into beds arranged in rows one foot asunder, and at the distance of four inches from each other in the row: the weaker plants must be suffered to remain in the seed-bed for another year. Thus, the Walnut-trees ought to be trained with single stems, till attaining the height of six or seven feet; when they may be suffered to form heads; as the branches will then be above the reach of cattle.

The trees should now be transplanted to a deep rich soil (though they also flourish on chalky lands), six feet asunder, and in rows at similar distance, in the form of a quincunx, till they bear fruit. Such as promise to be the most productive, may then be selected, and left for bearing, while the others are to be planted out for timber: the former must be *thinned* as they increase in size, by removing every intermediate tree, till they stand at the distance of from 24 to 48 feet from each other, according to the richness of the soil, and the progressive growth of the trees.

In trimming the stems of Walnut-trees, Mr. Forsyth directs the shoots and small branches to be separated close to the *bole*, or trunk; but, when the operation of lopping is performed, or any diseased, damaged, or cross branches, are to be pruned, he recommends the excision to be made at a *fork*, or eye; as part of the branch will otherwise decay, and thus materially injure the tree: in both cases, however it will be requisite immediately to apply the composition already described.

The Walnut is equally valuable as a timber, and as a fruit-tree. Its wood was formerly often employed both for building and in the manufacture of household-furniture; but being very brittle, it is at pre-

sent superseded by mahogany, and other foreign timber. Nevertheless, it is highly prized by joiners and cabinet-makers, for tables, gun-stocks, and other light articles; as it is beautifully veined, and admits of a fine polish. Farther, these trees are well calculated for planting them in the borders of orchards; because their large spreading heads shelter the smaller, and more weakly fruit-trees, from the effects of boisterous winds:....an infusion of their leaves in boiling water, mixed with soap-suds, urine, and lime-water, has, according to Mr. FORSYTH, been found very efficacious in destroying worms, and slugs in the ground, as likewise for exterminating insects on trees.

The fruit of the Walnut-tree is used at two different periods of its growth, namely, when green, for pickling, and in a ripe state, at the desert. For the former purpose, the nuts are fit in July or August, when they are about half, or three-fourths grown; but those only which are free from spots, should be selected, and plucked off the trees carefully by the hand.

Walnuts attain to maturity in the months of September and October, when they are usually beaten down by means of long poles; for, as this fruit grows principally at the extremities of the branches, indolent or timid persons find it too troublesome to gather it by hand. The former practice, however ought to be relinquished; as it is very detrimental to the fertility of the trees, and breaks or otherwise mutilates the young shoots: besides, the nuts cannot be easily preserved, when beaten down before they are sufficiently ripe.

The best method of gathering walnuts, is that of shaking the trees only at a time when the fruit has commenced spontaneously to drop; so that they may thus be easily obtained. If the nuts are to be kept for a considerable time, in a fresh state, they should first be well dried in an airy place, then packed in boxes, casks, jars, or other convenient vessels, in alternate layers of fruit, and fine, clean sand, that has been previously deprived of all moisture by the sun, or in an oven. Thus, walnuts may be preserved in a sound state till the approach of summer; but, in case the kernels be shrivelled, Mr. FORSYTH recommends such nuts to be immersed in milk and water, for the space of six or eight hours, previously to being used; by which expedient they will become so fine and plump, as to be easily divested of their internal skin.

[The *Juglans nigra*, or black Walnut of North America, is a grand forest tree, and highly valuable for cabinet work. The nuts are large and nearly round, and contain a large kernel, of pleasant taste, abounding with oil, which is expressed for the purpose of mixing with paint for inside work, but might be usefully substituted (if not rendered rancid in the operation of expression) for imported olive oil. The husk or shell of the nut, dyes different shades of brown.

The *Juglans alba oblonga*, or white Walnut or Butternut, generally grows to a less size than the black walnut. The nuts are oval; and, freed of the hull, are rough, and furrowed, containing a soft, oily, sweet kernel. When ripe the nuts are covered with a viscid se-

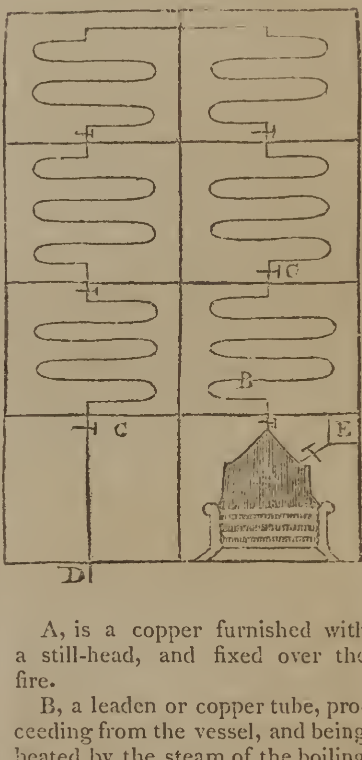
cretion. The young nuts pickled make an excellent condiment for fish or beef steaks, quite equal to the Maderia nut, commonly called *English* walnut. An extract of the bark made into pills, constitutes a mild and safe purge. The bark and shells of the nuts dye a good brown colour. See HICKORY-TREE.]

WARBLES, in farriery, are small, hard tumours arising on a horse's back, and generally occasioned by the heat, or friction, of the saddle, in travelling.

As these injuries frequently occur in horses, after hard journies, or a severe chase, we would advise every person, to whose care these noble animals are entrusted, minutely to examine the back every time when the saddle is removed. If any hardness or inequality should be perceived, from which a *warble* may probably ensue, the affected part must be bathed with the following liniment, that alone will be sufficient to check the progress of the swelling: Take of extract of lead, half an ounce; camphorated spirit of wine, two ounces; soft water, half a pint. Previously to adding the water, the extract and spirit should be well shaken, so that they may be duly incorporated.

WARMTH, a term expressing a moderate degree of heat.

The warming houses, in a climate so variable as that of Britain, is an object of the first importance, both to health and domestic comfort: hence, the invention or discovery of the most economical method of effecting such purpose, has engaged the talents of many able philosophers and artisans. Having already stated several of their useful contrivances, in the articles FIRE-PLACE, and STOVE, we shall now lay before our readers the following Cut, which represents a simple, and perhaps the least expensive, mode of communicating warmth from the *kitchen-fire*, throughout houses, manufactories, or other buildings, by means of *steam*.



A, is a copper furnished with a still-head, and fixed over the fire.

B, a leaden or copper tube, proceeding from the vessel, and being heated by the steam of the boiling water: it is carried through eight rooms (as delineated in the figure above given); traverses that side of the wall where the chimney is usually erected; and is likewise provided with stop-cocks, C, C; by means of which the course of the steam may be accelerated, or retarded, at pleasure.

D, is the spot at which the steam is discharged, after having circulated through the rooms.

E, is a cistern, by which the copper may be occasionslly supplied with water.

This contrivance was proposed many years since by Col. William Cook: it deserves to be more generally known, on account of its obvious simplicity; uniting convenience with economy, in warming a number of rooms by *one* grate: a considerable saving in fuel will thence result, while the kitchen-fire may, at the same time, be employed in roasting, or in any other culinary process....See the article Room.

[WARPING, signifies, 1. Towing of ships. 2. Preparing webs of cloth for the loom. 3. That species of irrigation which deposits a quantity of sediment from the flowing tide, and which form a stratum of soil or manure when the waters have receded from it. It is in this last sense that we shall notice it.

The origin of this great improvement in husbandry, is unquestionably derived from the Egyptians. Every one acquainted with the history of the *Nile*, knows, that the sediment left by that river in its annual over-flowings, acts as excellent manure, and enables the inhabitants to reap abundant crops. In England the practice has been partially followed, particularly in the counties of Lincoln and York; and also in Italy, according to Simonde.

The improvement consists in letting in the tide at high water to deposit the warp, and permitting it to run off again as the tide falls. But to render it efficacious, the water must be at command, to keep it out and let it in at pleasure; so that there must not only be a cut or canal made to join the river, but a sluice at the mouth to open and shut as wanted; and that the waters may be of a proper depth on the land to be warped, and also prevented from flowing over contiguous lands, banks are raised around the fields to be warped, from three or four, to six or seven feet high, according to circumstances. Thus a soil of any depth is formed, which consists of mud of a vast fertility, though containing not much besides sand.

Mr. Tatham, from whose excellent work on "*Irrigation*" (see vol. 3. of this work, p. 395) has collected several accounts of the utility of warping, from the agricultural surveys of the counties of England, from all which the great advantage of the practice is rendered evident, and encourages its adoption in the United States. It appears, that many estates, which before the commencement of warping, were worthless, had been rendered as valuable as any in the kingdom. The lands in the vicinity of muddy creeks in New Jersey, might be considerably ameliorated by warping; the subject is therefore suggested to the consideration of the proprietors.

Lord Hawke whose details of the benefits derived from warping, are highly important, gives the following directions with respect to the cultivation of the lands thus improved: "The land" says he, "must be in tillage for some considerable time after warping, for six years at least. The land, when laid down, and continued in grass is not warped; for the salts in the mud would infallibly kill the grass-seeds. When it is

proposed to sow the land again with corn (grain) then the land is warped; when they find the grass decline, then they warp and plough it out. As the land varies in quality, so does the time in which it will produce good grass; the land is never fallowed but in the year when it is warped."

In Italy, (particularly in Tuscany) warping is called *comblee*, and is fully described by SIMONDE in his late work on the *Agriculture of Tuscany*.]

WARTS, are small, hard, indolent excrescences, or tumors, that have a rough surface, and appear principally on the face and hands of young persons; though sometimes settling on other parts of the body. But, if such deformities occur in individuals advanced in years, and are of a livid hue, with a smooth surface, they frequently become CANCERS, and ought to be treated in a similar manner.

Warts do not, in general, require immediate attention: for, unless painful or troublesome, they will, in most cases, gradually disappear. Where, however, they increase in size, and are attended with pain, it will be proper to remove them by a ligature. Another method of extirpating them is by evulsion, or plucking them out; but such practice is by no means to be recommended; as the warts speedily return. A preferable mode of eradicating them, is by the application of escharotics, or mild cauteries; for instance, crude sal-ammoniac, which must be moistened with water, and rubbed on the tumors, two or three times every day; or wetting them with the liquid salt of tartar; spirit of hartshorn, or tincture of Spanish flies; either of which has been successfully employed for this purpose....Another mode of exterminating *warts*, as well as *corns*, has been recommended, by the following plaster: Dissolve 1 oz. of gum galbanum in vinegar; evaporate the solution to a proper consistence; and add half an ounce of common tar, 2 drams of simple dyachylon plaster, 20 grains of verdigrease, and an equal portion of sal-ammoniac: let the two last ingredients be finely pulverized, and the whole be duly incorporated. Previously to its application, the warts ought to be well rubbed with moistened soap, again dried, and the plaster renewed every 12 hours. In obstinate cases, however, it will be necessary to resort to internal remedies, and to change the milk-diet of children, by allowing them a greater proportion of animal food.

WART-WORT, CHURN-STAFF, CAT'S-MILK, or SUN-SPURGE; *Euphorbia helioscopia*, L. an indigenous plant, growing in gardens, corn-fields, and cultivated grounds; flowering in July and August.... This vegetable, though eaten by cattle and sheep, imparts to the flesh of the latter animals a disagreeable flavour, and is also detrimental to their health.....The milky juice exuding from the stalk, tinges paper of a fine azure-blue colour.

WASHING, in general, signifies the cleansing of bodies or substances with water, and other abstergent ingredients.

Washing essentially contributes to cleanliness, and consequently to the preservation of health; hence, all persons ought to be habituated to this salutary practice, from their earliest period of life. Great caution, however, is requisite in wash-

ing infants: for which purpose, the water ought at first to be *tepid*, or of a moderate warmth; then gradually reduced to a cool temperature; and at length, it may be used as cold as the common atmosphere of the season. The head and neck must, farther, be rubbed during the whole process, with a wet sponge; and, together with the rest of the body, be immediately wiped dry with clean cloths; which, in the winter, should be previously warmed. Thus, children will be early inured to habits of cleanliness; and the attention of parents to this important object will be amply rewarded.

WASP, or *Vespa*, L. a genus of insects comprising 139 species, three of which only are natives of Britain.

1. The *Crabro*. See HORNET.

2. The *Vulgaris*, or COMMON WASP, is from half to three quarters of an inch in length; it is divided into 3 classes; namely, the *queens*, or females, which are furnished with stings, and are much larger than any other wasp, on account of the numerous eggs they contain. The *males* are less than the queens, and are not provided with stings: the number of these two classes is nearly equal in a nest, amounting in general to 200 or 300. The *mules* are principally employed in constructing the nests, and in providing the other wasps and the young insects with food: like the females, they are furnished with long stings.

The common wasps build their nests in the ground, where the females deposit their eggs singly: these are hatched in the spring; and in the course of three weeks, the young insects pass through the different states of larvae or grubs, and of chrysalids; when they become perfect wasps. The mules come first into existence; immediately enlarge the hole; and form the nest with fibres of wood, leaves, &c.; they feed the young males and females (more judiciously than some human parents) adapting the quantity and nature of such provision to the weakness of their stomachs. This food consists, first of the juices extracted from fruits and meat, but afterwards of the bodies of insects. As soon as each wasp acquires sufficient strength, it flies into the fields, and gardens, where the fruit is plundered, and bees are killed, with the view of obtaining their honey. Similar depredations are committed throughout the summer; but, in the month of October, when their supply begins to diminish, the males and mules attack the newly-hatched insects of their own species, and destroy them, together with the larvae, chrysalids, and eggs: they then fall upon one another, till the frost and rain exterminate nearly the whole, excepting a few females; which, in the ensuing spring lay new eggs, and thus become the parents of a numerous progeny; as a nest of wasps, towards autumn, consists of from 14 to 15,000 cells.

3. The *coarctata*, or SMALL WASP, is about half an inch long: it is hatched like the preceding species, with which its habits also correspond. The nests of the Small Wasps are constructed of woody fibres, reduced to a fine substance resembling paper: they are of an oval form; being suspended from the branches of trees; and covered with a kind of varnish, that renders them impenetrable to water.

Wasps are not only destructive to grapes, peaches, and the more

delicate kinds of fruit, but also to bees; the hives of which they attack and plunder, frequently compelling those industrious insects to change their habitation. To prevent such depredations, Mr. Forsyth recommends several phials, or small bottles, to be prepared, towards the time when the wasps appear. These vessels are to be filled, half or three parts full, with a mixture consisting of the lees of beer or wine, and the sweepings of sugar, or the dregs of molasses: next, they must be suspended by yellow pack-thread, on nails driven into different parts of garden-walls, so as to reach nearly the bottom. When the bottles are filled with insects, the liquor must be poured into another vessel, and the wasps crushed on the ground. Should the weather prove very hot, so that these marauders become very numerous, and will not enter the glasses exposed for their reception, Mr. F. directs them to be touched on the back with a little oil, when they will instantly fall down; their bodies acquiring a black or green colour; and the lateral pores through which they breathe, being closed up by the oil, they consequently perish.

As the proper remedies for procuring relief in the painful sensation arising from the sting of these insects, are similar to those employed for the *Sting of Bees*, we refer the reader to vol. i. p. 244. If, however, any wasps be accidentally swallowed in beer, or other liquor, a small portion of honey, vinegar, and sweet-oil, may be mixed together; a tea-spoonful of which should be frequently taken; till the pain and inflammation abate. The efficacy of this remedy has been fully proved by experience.

Waste Lands. See Land.

Watch. See Time-piece.

WATER, a transparent fluid, destitute of colour, taste, and smell: it was formerly considered as one of the four elements: when perfectly pure, it does not spontaneously undergo any perceptible change; remains liquid in the common temperature of the atmosphere; becomes *solid*, at 32 degrees of Fahrenheit's thermometer; and is converted into vapour, at 212°; but resumes its fluidity, on being reduced to any intermediate degree.

Water is capable of dissolving most of the natural bodies, and particularly salts; while it constitutes a material part both of the animal and vegetable kingdoms.

Till the latter end of the 18th century, water was generally believed to be a *simple* element, which might, by repeated distillation, be converted into *earth*: it is now, however demonstrated to be a *compound*.

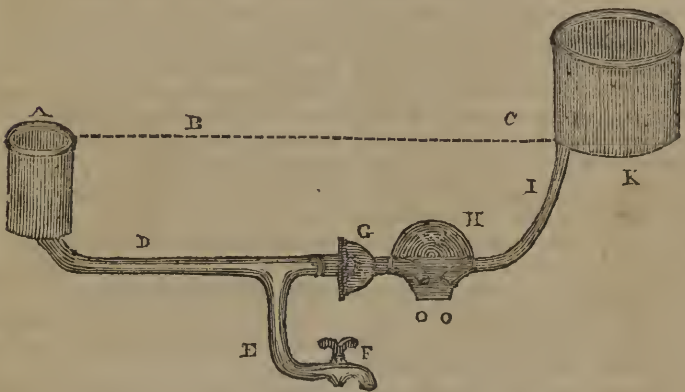
Water may be divided into two general classes, namely, *saline*, and *fresh*. The former is derived from the different seas which surround the globe: it contains a large portion of common salt, magnesia, &c. See Sea-water.

Fresh water may, farther, be divided into *atmospheric*, which includes hail, rain, and snow-water, and also dew; *stagnant*, such as that of lakes, ponds, and marshes; and *running*, which comprehends spring, well, and river-water. To these may be added Mineral Waters, being impregnated with various earthy and metallic ingredients, from which they derive peculiar properties.

Water is one of the most useful elements in the arts and manufac-

tures, as well as in rural and domestic economy: hence, various machines have been invented, for the purpose of raising and diffusing this salutary fluid....the following contrivances deserve particular notice.

The machine, of which the annexed figure will convey an accurate idea, was executed at Oulton, in Cheshire, by Mr. WHITEHURST, for the service of a brewhouse, and other offices, belonging to PHILIP EGERTON, Esq. Its design is, to raise water by the *momentum*, or force which this fluid acquires when confined: it having effectually answered the purpose, we have been induced to give a description of its constituent parts, from the 65th vol. of the "*Philosophical Transactions of the Royal Society*," for 1774.



A, represents the original reservoir, or spring; the upper surface of which corresponds with the horizontal line B, C, and also with the bottom of the reservoir K.

D, the main pipe, which is $1\frac{1}{2}$ inch in diameter, and nearly 200 yards in length.

E, is a *branch-pipe* of similar dimensions, for the use of the kitchen-offices......Mr. WHITEHURST observes, that these offices are situated 18 or 20 feet, at the least, beneath the surface of the reservoir A, and that the cock F, is about 16 feet below it.

G, represents a valve-box; and g, exhibits the valve.

H, is an air-vessel.

o, o, represent the ends of the main-pipe, which are inserted in the air-vessel, and are bent downwards, to prevent the air from being driven out, when the water is forced into it.

W, denotes the surface of the water.

Mr. WHITEHURST remarks that, as water discharged from an aperture beneath a pressure of 16 feet perpendicular height, moves at the rate of 32 feet in one second of time, its velocity from the cock F, will be in a similar ratio. And, though the aperture of such cock be not nearly equal to the diameter of the pipe D, yet the pressure of the fluid contained in the pipe

will be very considerable : so that if a column of water, 200 yards high, be thus set in motion, and then suddenly stopped by the cock F, its great force will open the valve *g;* and condense the air in the box H, as often as the water is drawn from the cock. This condensation was sufficient to force the water into the reservoir K, and even to burst the vessel H, within a few months after its first construction ; though it was made of sheet-lead, in the proportion of 9 or 10 lbs. to one square foot ; and was apparently very firm. Hence it may be rationally concluded, that the impetus of the water is far superior to the simple pressure of the column I, K ; and is therefore equal to a greater resistance (if it were required) than a pressure of four or five feet perpendicular height.

This ingenious contrivance is now applied to a variety of machinery, by the patriotic MATTHEW BOULTON, Esq. of Soho, near Birmingham ; who obtained a patent in December, 1797, for an improved apparatus, and methods of raising water and other fluids.... Mr. B. has substituted valves for cocks, and manufactures the pipes of such materials, as are calculated to prevent accidents from bursting. .....For a more specific account of these improvements, the reader will consult the 9th volume of the "*Repertory of Arts*," &c. where they are illustrated with two engravings.

The following machine, which is constructed on the principle of HIERO's Fountain, forms the subject of a plate in Dr. DARWIN's admirable work, entitled "*Phytologia* :" it is designed to raise water to a great perpendicular height, for the irrigation of land, in such situations as have the advantage of a small fall.

a, *b*, is the stream of water.

b, *c*, *c*, represents the water-fall, supposed to be 10 feet.

d, *e*, are two leaden or iron-vessels, containing a certain quantity of water, which may be computed to be about 4 gallons each.

f, *g*, *h*, *i*, *k*, *l*, are leaden vessels, each holding about two quarts.

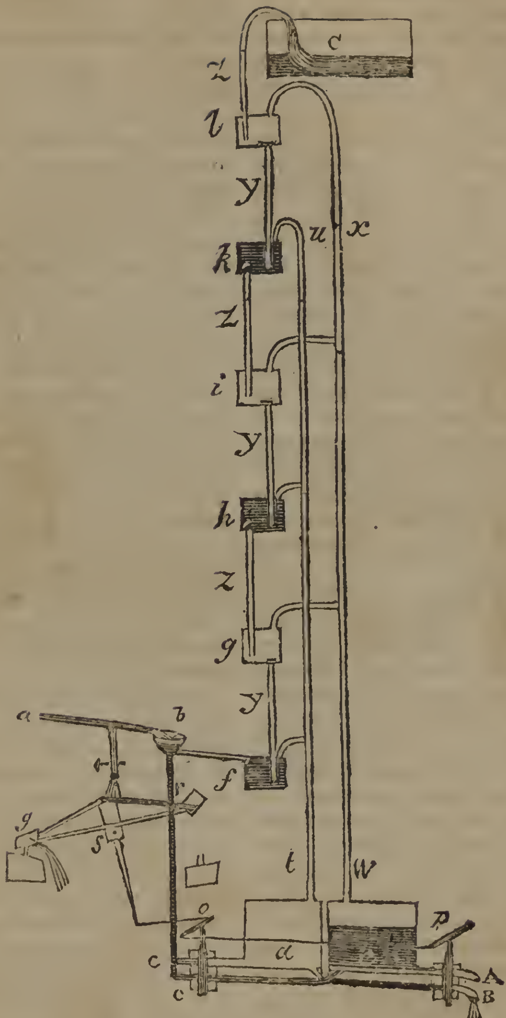
o, *p*, two cocks, each of which passes through two pipes, opening the one and closing the other.

q, *r*, is a *water-balance*, that moves on its center *s;* and by which the two cocks *o*, and *p*, are alternately turned.

t, *u*, and *w*, *x*, are two air-pipes of lead, both internally one inch and a quarter in diameter.

y, *z ;* *y*, *z ;* *y*, *z ;* are water-pipes, each being one inch in diameter.

The pipe *b*, *c*, *c*, is always full from the stream *a*, *b :* the small cisterns *g*, *i*, *l*, and the large one *d*, are supposed to have been previously filled with water. The fluid may then be admitted by turning the cock *o*, through the pipe *c*, *c*, into the large cistern *e*. This water, Dr. DARWIN remarks, will press the air, confined in the cistern *e*, up the air-pipe *w*, *x*, and will force the fluid out of the cisterns *g*, *i*, *l*, into those marked *h*, *k*, and C.....At the same time, by opening B, the water and condensed air, which previously existed in the large cistern *d*, and in the smaller ones marked *f*, *h*, *k*, will be discharged at B....After a short time, the water-balance, *q*, *r*, *s*, will turn the cocks, and exclude the water,



while it opens the opposite ones: the cisterns, *f*, *h*, *k*, are emptied in their turns by the condensed air from the cistern, *d*, as the water progressively enters the latter from the pipe, *b*, *c*.

In the year 1783, an excellent engine was erected at Windsor by the command of HIS MAJESTY, for the purpose of raising water from a deep well, to supply the wants of the Castle. It consists

simply of a grooved wheel, 3 feet in diameter, which is fixed on an axis that revolves horizontally over the well: an endless rope, sufficiently long to reach into the water, is passed over the wheel. Farther, a winch is attached to one end of the axis, by means of which it may be turned; and, on its opposite extremity, there is another wheel, weighted with lead, that acts as a fly, and serves to increase the velocity. When the wheel is turned, every part of the rope is drawn through the water, and ascends to the top, carrying with it a considerable quantity of that fluid: thus, by the pressure of the rope on the wheel, during its revolution, the water is discharged into a cistern placed for its reception.... This expedient was suggested by a sagacious mariner; and so remarkable is the facility with which the whole may be worked, that, though the well is nearly 200 feet in depth, the machine may be turned by one hand, and sufficient water be raised to fill a pipe; the diameter of which is equal to that of the rope.

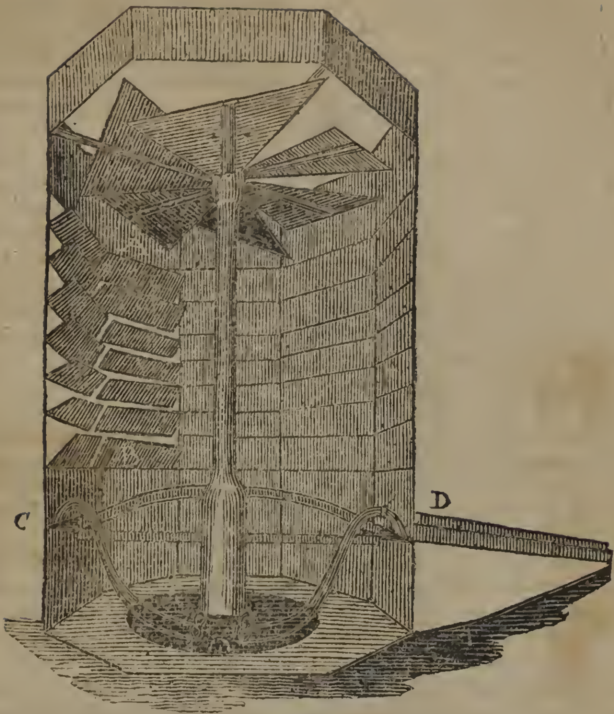
In those situations, where it is an object of some importance to raise water to the height of a few feet, by the power of the wind, for the purpose of *draining morasses*, or of *watering lands* on a higher level; we conceive the *horizontal wind-mill, with a centrifugal pump*, to be a most useful machine: we have therefore annexed a representation of it, similar to that given by Dr. DARWIN, in the work above quoted.

The machine here delineated, consists of a windmill-sail, which is placed in an horizontal direction, similar to that of a smoke-jack, and is surrounded by an octagon tower. The diverging rays of such tower, *a*, *b*, *a*, *b*, if on a small scale, may be made with deals two inches in thickness; but, on a large plan, they should be constructed of brick work. These upright pillars are connected by means of oblique boards, represented at A, B, which are placed *horizontally* from pillar to pillar, with respect to their *length;* and at an angle of 45 degrees, with regard to their *breadth;* so as to form a complete octogan, including the horizontal windmill-sail near the top:....as the wind strikes against any of such boards, from whatever quarter, it is bent upwards, and then acts upon the horizontal wind-sail. Farther, these boards may either be fixed in their respective situations, or be made to turn upon an axis a little beneath their centres of gravity, so as to close themselves on that side of the octagon tower, which is most distant from the wind.

Below the shaft of the wind-sail, a centrifugal pump is fixed, with two arms, as represented at C, D. It consists, simply, of an erect, bored trunk, or of a leaden cylinder, furnished with two opposite arms, having a valve at the bottom; which is so constructed as to prevent the return of the water; and another valve at the extremity of each arm, for excluding the access of air above the current of the water, while the latter flows out.

c, *c*, *c*, *c*, a circular trough for the reception of the streams from C and D, to convey them to those situations where the water may be required.

In December, 1783, a patent was granted to Mr. JOSEPH BRAMAH, for his invention of a water-cock upon a new construction.....


C
D


a
b
c

His privilege is now expired; but, as the principle on which he proceeds could be explained only by the aid of an engraving, we refer the reader to the 1st vol. of the "*Repertory of Arts*," &c.

Another patent was obtained, in January, 1791, by Mr. JOSEPH BROCKS, for his invention of a buoyant machine, calculated to raise water from a lower to a higher level, without the aid either of fire or of wind, and without taking any water from the uppermost level:....the curious reader will find a particular description of this contrivance, in the 7th vol. of the work above quoted.

In the year 1801, the *Society for the Encouragement of Arts*, &c. adjudged their silver medal to Mr. H. SARJEANT, of Whitehaven, Cumberland, for a *Machine for raising Water*, of which we have given an engraving.

This engine was erected at Irton-Hall, which is situated on an ascent of 60 or 61 feet perpendicular height: at the foot of this elevation, about 140 yards distant from the offices, there runs a small stream of water; and, in order to procure a constant supply of that necessary fluid, the object was to raise such stream to the house, for culinary and domestic uses. With this view, a dam was formed at a short distance above the current, so as to cause a fall of about four feet: the water was then conducted through a wooden trough, into which a piece of leaden pipe, two inches in diameter, was inserted, and part of which is delineated at A.

The stream of this pipe is directed in such a manner as to run into the bucket B, when the latter is elevated; but, as soon as it begins to descend, the stream passes over it, and flows progressively to supply the wooden trough or well, at the foot of which stands the forcing-pump C, being three inches in diameter.

D, is an iron cylinder, attached to the pump-rod, which passes through it: such cylinder is filled with lead, and weighs about 240lbs. This power works the pump, and forces the water to ascend to the house, through a pipe, one inch in diameter, and which is 420 feet in length.

At E, is fixed a cord, which, when the bucket approaches to within four or five inches of its lowest projection, extends, and opens a valve in the bottom of the vessel, through which the water is discharged.

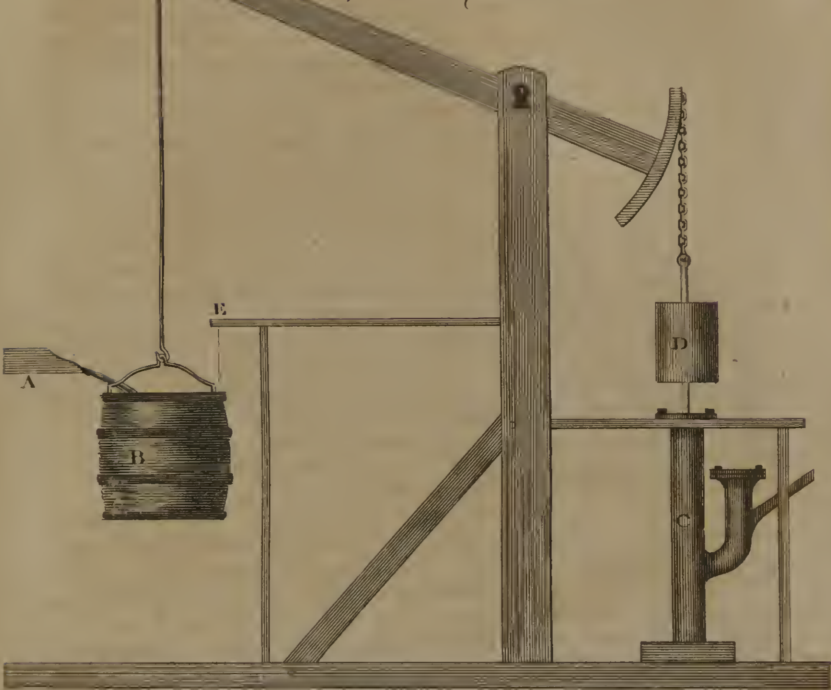
The machine, here described, had at the time of Mr. SARJEANT's communication to the Society above mentioned, been six months in use, and fully answered the purpose for which it was designed.... The artizans employed were a plumber, blacksmith, and carpenter: the whole expense, exclusive of the pump and pipes, did not exceed 5*l*.

The latest contrivance, within our knowledge, for facilitating the motion of machinery, is the *undershot water-wheel*, invented by the late Mr. BESANT, of Brompton; on whose widow, the *Society for the Encouragement of Arts*, &c. in 1801, conferred a reward of ten guineas: and, as it promises to be of great service in many situations, we have given a representation of it in the annexed plate.

Description of the late Mr. BESANT's *Undershot Water-wheel.*

Fig. 1, *a*.....A, represents the

Mr. H. Sarjeant's Machine for raising Water.



Mr. Besant's Undershot Water-Wheel.

Fig. 1. b.

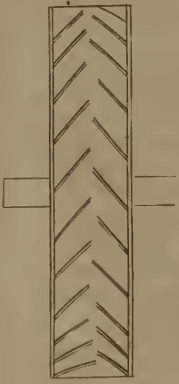


Fig. 1. a.

Shallus Sc.

body of the water-wheel, which is hollow, in the form of a drum, and is so constructed, as to resist the admission of water.

B, is the axis on which the wheel turns.

C, The *float-boards*, placed on the periphery of the wheel, each of which is firmly fixed to its rim, and to the body of the drum, in an oblique direction.

D, is the reservoir, that contains the water.

E, the pen-stock, for regulating the quantity of water, which runs to the wheel.

F, represents the current, that has passed such wheel.

Fig. 1, *b*, is a front view of the water-weel, exhibiting the oblique direction, in which the float-boards C, are placed on the face of the wheel.

In the common water-wheels, more than half the quantity of that fluid passes from the gate through the wheel, without affording it any assistance: the action of the floats is resisted by the incumbent atmosphere, at the moment when these leave the surface of the *tail-water*; and, as a similar proportion of water with that which passed between the floats at the *head*, necessarily flows between them at the *tail*, the motion of the wheel is greatly impeded. On the contrary, by Mr. Besant's contrivance, no water can pass, excepting that which acts with all its force on the extremity of the wheel: and, as the floats emerge from the water, *in an oblique direction*, the weight of the atmosphere is thus prevented from taking any effect. Although his new wheel is considerably heavier than those constructed on the old plan, yet it revolves more easily on its axis; the water having a tendency to float it. Lastly, repeated experiments have proved Mr. Besant's wheel to be so decidedly superior, that, when working in deep *tail-water*, it will carry weights in the proportion of three to one; on which account it will be particularly serviceable to tide-mills.

As a constant beverage with meals, water is certainly preferable to any other liquid. Its relative salubrity, depends on the peculiar properties which it possesses; on the various animal, vegetable, or mineral particles, with which it may be impregnated, and the places whence it is procured. Thus, the water from Springs, being conveyed and filtered through different layers of stone, sand, &c. before it arrives at the surface of the earth, is much purer than most other waters. The transparency of that obtained from *wells*, varies according to the strata of earth through which it rises; but the most wholesome fluid is derived from sandy soils, where it has undergone a perfect filtration. The water of lakes and ponds, in general, has similar properties with that of rivers, but, being less agitated, it acquires a greater degree of impurity, and is consequently unfit for culinary purposes; though, on account of its softness, it may be advantageously employed in washing linen....*Rain-water* collected in the vicinity of towns, of marshes or of mines, especially during the summer, is likewise impure: it ought, therefore, to be used solely for cleaning houses, or linen, and watering gardens. The fluid, obtained by dissolving *snow*, is somewhat purer; and *hail-water* has still fewer extraneous particles, in consequence of its congealing in

the air; so that it cannot, during its descent, combine with noxious ingredients.

As the health of mankind materially depends on the wholesomeness of the water which is introduced into the human body, by food and drink, different expedients have been devised, for preserving it in a state of purity, especially on long voyages. Hence, it has been recommended to add a small quantity of lime to every cask of water. Dr. BUTLER (in his Essay quoted in article SEA WATER), advises 4 oz. of fine, clear pearl-ash to be dissolved in 100 gallons of fresh water, and the cask to be closed in the usual manner. The proportion of the pearl-ash may be increased or diminished, according to circumstances. As an instance of its efficacy, Dr. B. relates, that he put one oz. of such alkali into a cask containing 25 gallons of Thames-water, and suffered it to stand for upwards of a year and a half, opening it once in 4 months; when he found it perfectly sweet. He adds, that he afterwards used some of this preserved fluid for boiling PEASE and BURGOO; that it made the former as soft, and answered the different culinary purposes as well as water newly drawn from rivers.

In the first volume of the "*Rapport General des Travaux de la Societe' Philomatique de Paris*," we meet with a Memoir by M. VAUQUELIN, on several means of preserving water, on long voyages..... With this view, the inside of the casks was washed with lime-water, which changed into a calcareous carbonate, and thus effectually prevented putrefaction. The same desirable object may be attained, by adding a small portion of vitriolic acid and of alkali, to every cask; which will preserve the water in a pure and salubrious state for at least 12 months. Charcoal has also proved to be eminently adapted to such purpose: the most advantageous mode of employing this substance, is that of *charring* the inner surface of the staves, previously to constructing the casks.

The latest method of preserving fresh water in a sweet state, at a great distance from land, is that communicated to the *Society for the Encouragement of Arts*, &c. in 1800, by SAMUEL BENTHAM, Esq. and for which he was presented with their gold medal. It consists simply in stowing water in wooden cases or *tanks*, lined with metallic plates, known under the name of tinned *copper-sheets:* the joinings of such cases being carefully soldered, so that the water cannot find the least access to the wood. These tanks may be manufactured of any shape adapted to the hold of the ship, and thus contain any quantity of water; so that considerable *stowage-room* may be saved on board of vessels, which is at present occupied by the casks. In justice to Mr. BENTHAM we add, that two tanks of water thus preserved, were submitted to the examination of the Society; and though they had been *three years and a half at sea*, the fluid was perfectly sweet, wholesome, and fit for any culinary purpose.

On the other hand, if water has become *putrid*, it may be divested of its pernicious properties, by the process recommended, vol. i. p. 40; by boiling, or by distillation; and by filtering it through the machines delineated and described in the article FILTRATION;

or through Mr. COLLIER's patent vessels for purifying oil and other liquids; a specification of which is given in the 10th vol. of the "*Repertory of Arts*," &c. and illustrated with a plate.

In October, 1790, a patent was granted to Mrs. JOHANNA HEMPEL, for her invention of a composition; which, on being formed into vessels, is said to possess the advantage of filtering water or other liquids, in a cheaper, more easy, and expeditious manner, than could be effected by any other preparation. The proportions of the materials, employed for this purpose, vary according to the size of the basons, or jars to be manufactured. Thus for vessels intended to contain a quantity of water not exceeding one gallon, *four* parts of tobacco-pipe clay must be incorporated with *nine* parts of coarse sea, river, drift, or pit sand, and worked on a potter's-wheel into any form, as fancy or convenience may direct. But, as the composition thus prepared, is apt to crack in the fire, if it be wrought into basons, &c. of a larger capacity, the patentee recommends such vessels to be manufactured of equal parts of the clay and sand above mentioned. She further states other proportions of clay, loam, &c. which may be employed according to the size of the bason or other vessel; and for a specification of which, the reader will consult the 2d vol. of the "*Repertory of Arts*," &c.

To conclude this important subject, we shall state a few other simple methods of restoring putrid water to its original purity.

Dr. LIND directs a small cask, open at both ends, to be placed within a larger vessel, the head of which has been taken out: clean sand and gravel are then to be put into both vessels, so that the level of the sand in the inner cask be higher than the bed in the intermediate space between the two barrels; sufficient room being left for pouring in the water. A cock should now be placed in the external cask, above the gravel or sand; and somewhat lower than the surface of the materials in the interior vessel. The water is poured in, at the top of the cask last mentioned; it sinks through the mass of sand; and, after passing through the bed in the intervening space, it ascends, so that it may be drawn off perfectly sweet and clear: when the surface of the gravel becomes loaded with impurities, it should be removed, and fresh sand be substituted.

According to the experiments of M. LOWITZ, $1\frac{1}{2}$ oz. of pulverized charcoal, and 24 drops of the sulphuric or vitriolic acid, are sufficient to purify $3\frac{1}{2}$ pints of putrid or corrupted water, without communicating to it any perceptible acidity: he directs the oil of vitriol to be first mixed with the water; after which the charcoal must be added; but, if the sulphuric acid be omitted, it will be requisite to employ a triple portion, or $4\frac{1}{2}$oz. of charcoal. When spring-water has acquired an unpleasant, hepatic flavour, it may be greatly improved by filtering it through a bag half filled with powdered charcoal. This substance may again be dried, and pulverized, when it will answer the same purpose a second time; and, if it lose its purifying effect, by repeated use, such property may be recovered, by making it red-hot in a close vessel. Prof. HUFELAND recom-

mends carbon to be reduced to fine powder; a spoonful of which must be mixed with a pint of stagnant, corrupted, or bad water: the whole should be well stirred, then suffered to stand for a few minutes, and afterwards passed slowly through filtering paper. He remarks, that the same powder will serve repeatedly; and after drying it, he advises travellers to keep it closely corked in a bottle; because the influence of the air would render it useless. Lastly, if either of the expedients already described, cannot be conveniently adopted, the putrid tendency of water may be corrected, by mixing vinegar, or acid of lemons, with the corrupted fluid; and, in case any quantity of the latter should have been accidentally swallowed, its injurious effects may be obviated, by immediately taking small, but repeated, draughts of vinegar.

[*Water as a Manure*....The fertilizing property of water is well known. But it has lately been discovered, that when rendered putrid by the immersion of certain vegetable matters, its fertilizing properties are greatly increased.... *Flax* in particular, has been found by Mr. Billingsby, a well known English farmer and improver, to have this effect in a remarkable manner. Mr. Tatham mentions, that he "saw in 1790, a pool constructed in the centre of a garden in Richmond, into which the water was conveyed by pipes; these pipes communicated to a pump erected in a house at the end of the garden, wherein all vegetables gathered for the table were prepared by the gardener, who was a Frenchman. A cistern with holes in the bottom, was placed beneath the spout of the pump, so that when the vegetables were put into it to be washed by pumping the water, the foul water and filth was immediately conducted into the putrescent reservoir in the center, whence the garden was watered." This plan should be adoped wherever it is practicable.

In all mills worked by water, some inconvenience is found to arise from the irregularity of speed, occasioned by the variation of the head of water at the pentrough. The specific weight being necessarily proportioned to the perpendicular altitude of the water, its velocity is increased by a greater, and diminished by a less head. No accurate judgment as to the quantity really admitted, can be formed from the position of the shuttle. The space only is regulated by this; but the quantity of water passing through that space depends on its specific gravity, in proportion to which its course is accelerated. Hence an irregular movement of machinery, and much inconvenience, where precision is requisite, as in the manufactory of silk and cotton. To remedy this, Mr. Quaile contrived to regulate the quantity of water delivered, by a float, and taking the whole of the water from the surface, instead of delivering it from the bottom of the pentrough. For this useful invention, the *Society for the Encouragement of Arts* in London, presented Mr. Quaile with a silver medal in 1793.

By this contrivance also, room may be saved in the extent of the dam, as the water may be suffered to rise to a great height, without the inconvenience attending the increased velocity of its discharge. In cases also of temporary deficiency, the water which remains,

will by this means, be worked to the greatest advantage. For a description and plate of this contrivance, the reader is referred to the *Transactions of the Society of Arts*, for 1793.

Under the article IRRIGATION, an account of the simple and effectual contrivance of Mr. DAVID WITMER, who lives nine miles east of Lancaster, on the turnpike, was promised under an expectation that a draught could be procured in time for a plate. This however did not arrive in time, a short description will perhaps not be unacceptable to our country readers, and be sufficiently intelligible to persons acquainted with mill or pump work.

Mr. WITMER first laid horizontally in the bottom of the spring, a log of wood, bored through in the manner that pumps are bored: this log has three holes in the upper side, which communicate with the longitudinal perforation: into the middle hole he has inserted the conveying pipe which is also a bored log; and into the two holes on each side, or towards the end of the log are inserted two forcing pumps; in the log or pipe that lies horizontally, there are four valves, two of which open to admit the water when the pistons of the pumps are elevated alternately, whilst the other two are shut: these again open when the pistons are depressed to permit a passage up the pipe which stands betwixt them.

The pistons are elevated or depressed by means of a very simple piece of machinery, consisting of a small overshot water-wheel, six feet in diameter, with *float-boards* one foot in length. This wheel is turned by a small stream of water; and, upon its axis there is a crank which communicates an alternate elevation and depression to the piston rods.

The water is forced thirty five feet up until it comes to a pipe before the house: this pipe has two perpendicular perforations which connect at the top, and also connect with two separate hollow logs below. A fosset is fixed in this pipe, through which the water runs in a perpetual stream, unless when stopped; it then rises in the pipe, and falls down the second bore, and is conveyed by perforated logs under ground, to the house adjoining the dwelling house, and the overplus water is conveyed to the garden.

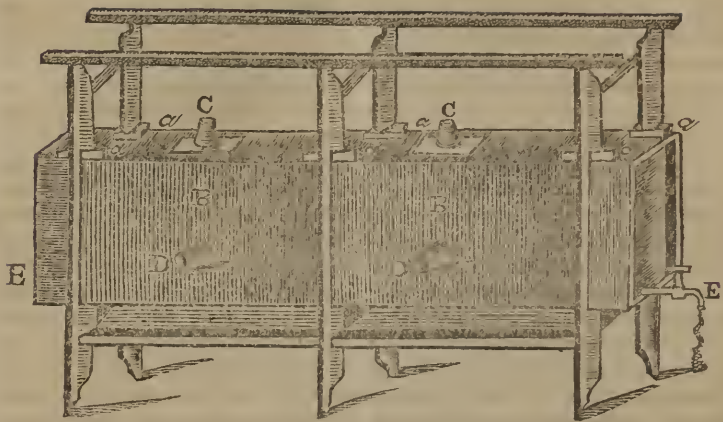
Thus at an expense not exceeding 100 dollars, Mr. WITMER's house is furnished with a constant supply of water, and his grounds adjoining, sufficiently irrigated: after the water has been thus elevated 35 feet, by applying a small pipe, such as is used with fire engines, a stream may be conveyed 25 feet higher, to any part of the building.]

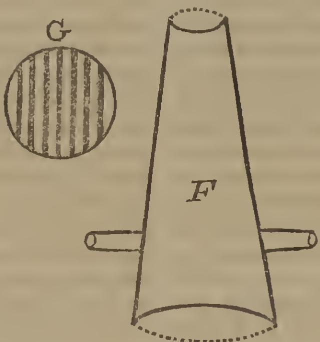
[WATER-BOILER. In this useful contrivance we are indebted to the ingenious TIMOTHY KIRK, of York-town, Pennsylvania. The following cut will give a good idea of it.

A, a frame consisting of six posts, connected by railing at the top and bottom.

B B, a cistern with a partition in the middle.

C C, two tubes passing through the middle of each cistern, extending from the bottom a few inches above the top.





D D, small cross tubes connected with the tube C C as a mean of supplying the fuel.

E E, two cocks to draw off the contents.

F, the tube disconnected with the cistern.

G, a grate placed at the bottom of the tube parallel to the bottom of the water in the cistern, on which the fuel rests while consuming.

The cistern is formed of pine or of oak plank well jointed, and secured by wedges in the frame marked *a*. A cistern of three feet square, must have a square opening in the plank which forms the bottom, of 26 inches, covered with a sheet of copper or iron, secured with nails to the plank, to which the tube is fixed by means of rivetts ; the whole to be set in brickwork, with a round hole directly under the bottom of the tube, in order to contain the ashes through

which, (by means of a flue left for the purpose) the air is communicated to the fire in the tube; for as soon as fuel is supplied by means of the tubes, they must be inclosed with caps to prevent the entrance of the air, otherwise than by the bottom through the flue and grate: on this, much of the importance of the discovery depends. Mr. KIRK has constructed one cistern on the above plan, containing six barrels which he boiled powerfully with 56 pounds of wood, and he thinks that the addition of 56 pounds more, would keep the same quantity of water boiling during 24 hours. Mr. KIRK constructed one of a round shape, with iron hoops containing two barrels of water, which has been tried by a person engaged in the manufactory of salt, and found with thirty pounds of wood to be capable of evaporating ten gallons of water in less than an hour, and hence he concluded, if a large cistern was formed, (say thirty feet long, by three wide) to contain twelve tubes, much more might be evaporated in proportion to the fuel consumed.

Such a boiler should be constructed upon every farm, for the purpose of boiling corn for hogs and horses, and dranks or mashes for cows, and stall fed cattle.

Upon submitting the above to Mr. BENJAMIN DEARBORN of Boston, when in Philadelphia, he made the following remarks:

"1. The principle on which the boiler is constructed is good, as has been proved many years ago.

"2. The form of the boiler and the tubes, and the manner of connecting them are ingenious, and are new to me: but if the wooden vessel be square, the frame which confines it should be so constructed as to wedge the joints together each way; yet I think a vessel of a conical form, hooped as the inventor describes, must be preferable to any other shape.

"3. If the tubes instead of being conical, were cylindrical with a moveable cover, the fuel might be inserted at the top, without the necessity of cross tubes at the bottom. I have seen stoves on this construction." Portable furnaces are also made in this way.]

WATER-ALOE, or FRESH-WATER SOLDIER, *Zostera Aloides*, L. an indigenous perennial, growing in fen-ditches and slow-streams; flowering in the months of June and July. This plant affords nourishment to a great variety of insects, some of which pursue it even to the bottom of the water. It is eaten by hogs, but refused by goats. From its ashes, an excellent alkaline salt may be obtained, by filtrating and evaporating the ley. BOHMER observes, that such salt is not only well adapted to the curing of beef and other meat, but also forms a valuable ingredient in the manufacture of glass; nay, that it is occasionally used in England as a substitute for pot-ash, in the process of making soap.

WATER-AVENS. See AVENS.

WATER-CALTROPS, or *Trapa natans*, L. a valuable exotic, originally from Asia, though likewise growing wild in the ponds and ditches of Germany: its fibrous roots strike deeply into the soil; and, when the stalk attains the surface of the water, its extremity presents a pyramidal bud, which, on the access of air, unfolds and spreads the convoluted leaves.....

The plant flowers in June or July; and produces its excellent fruit in August or September.

Although the water-caltrops be, on the Continent, considered as a troublesome weed in lakes and fish-ponds, yet we are persuaded that it may, with great advantage, be introduced into many marshy situations, especially those destitute of fish; to which animals it is certainly pernicious. The *kernel* contained in the nut of this aquatic vegetable, may be eaten, either raw or boiled: when dried and reduced to flour, it affords one of the most nutritive ingredients in broths, puddings, and other culinary dishes. PLINY informs us (book xxii. chap. 12,) that the ancient Thracians converted this fruit into *bread;* and fed their horses with the leaves.... Formerly, the black roots of this luxuriant plant were reputed to be poisonous; but it has lately been ascertained, that the Japanese boil and eat them, generally, in their daily soups.

WATER-CAN. See Yellow Water-LILY.

WATER-CLOSET, an useful contrivance, the purpose of which requires no explanation.

In December, 1789, a patent was granted to Mr. THOMAS ROWNTREE, for an improvement in the construction of water-closets; by arranging the several parts, in such manner that the whole apparatus may be moved at once, without being taken to pieces. His machine may, likewise, be adapted to the apartments of the sick, so as not to occupy a larger space, or to be more cumbersome, than a common night-chair; while the fœtor is effectually suppressed by means of certain tubes. A more diffuse account of Mr. ROWNTREE's principle, occurs in the 11th vol. of the "*Repertory of Arts*," &c.

Another patent was obtained by Mr. THOMAS BINNS, for his invention of a machine applicable to privies and water-closets; from the peculiar construction of which, the bason is not only cleansed by the introduction of water, but a sufficient quantity of that fluid is left in the vessel, without the assistance of any person. This machinery, however, having been found too bulky, Mr. BINNS, procured a second patent in November, 1800, for his contrivance of an improved apparatus, answering the several purposes of a water-closet, bidet, and easy chair; which are comprized in one-third part of the room occupied by the common portable water-closets. From its lightness, and small size, the new machine is well calculated for travelling, for camps, and for ships.....In the 7th and 15th vols. of the work above quoted, the inquisitive reader will meet with full specifications of both patents, which are farther illustrated with engravings.

WATER-COLOURS. See COLOUR-MAKING, vol. ii. p. 178.

WATER-GLADIOLE, or CARDINAL FLOWER, *Lobelia Dortmanna*, L. is an indigenous perennial, growing in mountainous lakes, especially in Cumberland, Westmoreland, Wales, and Scotland; where its beautiful pale, blue flowers appear in the months of July and August....The whole of this plant, which grows beneath the surface of the water, abounds with a milky juice. It may be easily propagated by seeds, by offsets, or by cutting: and, vegetating with great luxuriance, it deserves to be raised in moist or marshy situations.

WATER-PEPPER, LAKEWEED.

or BITING SNAKEWEED, *Polygonum hydropiper*, L. an indigenous plant, growing on the sides of rivulets, lakes, and ditches; flowering from July to September...... The whole of this vegetable possesses a very acrid taste: its fresh leaves have, nevertheless, with advantage, been applied externally, for cleansing old fistulous ulcers, and consuming fungous flesh. An infusion of these leaves is said to promote the urinary discharge in phlegmatic habits; and has frequently been of service in scorbutic complaints. When mixed with soft soap, the ashes of the lake-weed are used, as a nostrum, for dissolving the stone in the bladder....According to Dr. WITHERING, the acrimony of this herb rises on distillation; and two or three half pints of the water, drank daily, have been found very effectual in some nephritic cases. It imparts a yellow colour to wool. The Water-Pepper is refused by every species of cattle....See also BLISTER.

WATER-PROOF, a term applied to those stuffs, which have undergone certain chemical or mechanical processes, and thus become impermeable to moisture.

Having already stated, under the heads of BOOT and LEATHER, the most proper means of rendering those articles water-proof, we shall at present confine our attention to the expedients that have been devised for making linen and woollen cloth, paper, &c. capable of resisting humidity.

In July, 1797, a patent was granted to Mr. HENRY JOHNSON, for his invention of a vegetable liquid, the design of which is to bleach and cleanse woollen, or other stuffs; to prepare them for the reception of a certain compound, calculated to render them not only water-proof, but also more durable and elastic, when manufactured into articles of dress, which he terms *Hydrolaines*.....In order to obtain first the vegetable liquid, the patentee directs horse-chesnuts, or the rinds and kernels of oranges, that are usually thrown away, or the offals and gall of fish, to be boiled for four or five hours; after which they are suffered to cool and settle, for a few days: in cases where these substances cannot be easily procured, 8 quarts of water may be added to every pound of British barilla, and the mixture allowed to dissolve for two or three days. Next, one pint of pearl-ashes, or of purified kelp, or wood-ashes, must be added to either of these preparations; and, after the whole has been duly mixed, for 24 hours, a certain portion of *Ryegate-lime* is slacked in the compound, for the purpose of imparting the *caloric*; of precipitating the carbon of the ashes; and moderating the causticity of the liquor. Now 40 quarts of water are to be boiled with one quart of fish, linseed, or other oil; adding to this decoction half an ounce of the salt of sorrel, or of sugar, or of the rectified salt of tartar; the object of which is to combine the oil with the water. Lastly, after this composition has stood for 12 hours, it is to be strained, and one quart of such oily water to be mixed with every twelve quarts of the liquid, prepared in the manner above described: when the mixture is completely settled, it forms, what the patentee calls, a *blanching lixivium*.

The linen, woolen, cotton, or silk stuffs, hats, or leather, are to be immersed in such lixivium, and

extended on a frame. Caoutchouc is then to be dissolved in spirit of turpentine (the smell of which may be dissipated by the addition of equal parts of oil of wormwood and spirit of wine), so as to form a varnish : this liquor must now be applied to the wrong side of the stuffs that are to be prepared, by means of a solid piece of India rubber; and minute shreds of cloth, wool, silk, or worsted, should be sifted over the varnish : in the course of two or three days, it will be perfectly dry ; and the shreds, by their adhesion to the dissolved caoutchouc, will form a lining impermeable to water.

In 1801, another patent was granted to Messrs. Ackermann, Suardy, and Co. for their invention of a process, by which every species of cloth may be rendered *water-proof*.......As the patentees have not thought proper to publish the particulars of their process (though such concealment is contrary to the nature of *Letters Patent)*, we shall briefly remark from our own observation, that their method appears to be a simple impregnation of cloth with wax previously dissolved, and incorporated with water, by the addition of pure vegetable alkali, or pot-ash. This being the cheapest and most expeditious mode of reducing wax to a fluid state, we are farther inclined to believe that our conjecture is well founded ; because all the woollen cloth prepared in the manufactory of Messrs. Ackermann, Suardy, and Co. *feels* somewhat harder than such as has not been *waxed ;* for the same reason, it will stand a shower of rain only so long as it has not been subject to friction ; and we understand from those who have worn *patent water-proof coats*, that in the sleeves particularly, they are very apt to admit moisture through the different folds. Nevertheless, their process is entitled to attention ; and it deserves to be adopted principally in those cases, where the manufacture is not liable to be impaired by friction ; such as coverings for tents ; for horses exposed to the rain when at rest ; and especially for paper in which gunpowder, or steel and other goods, are to be packed.

The following simple process is stated to be that employed by the Chinese, for rendering cloth *water-proof:* Let an ounce of white wax be dissolved in one quart of spirit of turpentine ; the cloth be immersed in the solution, and then suspended in the air, till it be perfectly dry. By this method, the most open muslin, as well as the strongest cloths, may be rendered impenetrable to the heaviest showers ; nor will such composition fill up the interstices of the finest lawn ; or in the least degree affect the most brilliant colours.

Watering-of-land. See Irrigation.

WAX, a solid concrete, abounding in the vegetable kingdom, whence it is collected by bees..... In the article Bee's-wax, we have stated the manner in which this substance is obtained, and likewise the uses to which it is applied : at present, therefore, we shall direct our attention to the *blanching* or whitening of wax, and to the process by which it may be *artificially* extracted from vegetables.

With a view to bleach *wax*, it is cut in small pieces, melted, and poured into cold water, where it granulates. In this state, it is exposed to the sun and air ; melted.

and granulated repeatedly; then submitted to the influence of the sun, air, and dew, in the interval between each liquefaction. When the wax is perfectly blanched, it is dissolved for the last time, and cast into flat moulds, in which it is again exposed to the air, for one or two days, in order to render it more transparent. [See BLEACHING.]

Wax may be extracted from the leaves and petals of numerous vegetables (see the *General Index of Reference*); by collecting, bruising, and dissolving them, first in water, and then in alkohol, or spirit of wine, till every other ingredient that is soluble in these fluids, be completely separated. The residuum is now mixed with six times its weight of a solution of pure ammonia: when it has been thoroughly macerated, the liquor must be decanted; filtered; and, while it is briskly stirred, a sufficient portion of sulphuric acid must be gradually added, to super-saturate the alkali. Thus, the wax will be precipitated in the form of a yellow powder; which, on being carefully washed with simple water, and melted over a slow fire, possesses all the properties of bees-wax.

WAY-BENNET. See Wall-BARLEY.

WAY-BREAD. See Greater PLANTAIN.

WAYFARING-TREE. See Mealy GUELDER-ROSE.

WEANING, is the act of gradually removing an infant from the breast, and habituating it to take common food.

Weaning requires to be conducted with some precaution: it will therefore, be advisable to inure children to take proper aliment out of a boat or tea-cup, at the age of 3 or 4 months; so that they may not too suddenly, and sensibly, feel the loss of the breast. To facilitate this change, the human milk should be occasionally with-held from them, while the mother or nurse may partake of such aliment as tends to diminish the secretion of that salutary fluid.

Children committed to the care of wet-nurses, ought, in prudence, not to be allowed to suck, after the age of six or eight months; as their infantine faculties then begin to unfold; and they are apt to acquire an undue degree of affection for their foster-mothers. On the other hand, they should not be precipitately removed from the breast; because this tender part is thus liable to become inflamed, and ulcerated; so that scirrhous tumors, and even cancers, may arise from such conduct.

Lastly, the diet of children, when weaned, ought to be light, and adapted to the strength of their stomach, and constitution: hence, all coarse food must be strictly avoided, during the first and second year of life; for such mistaken indulgence often lays the foundation of diseases originating from a bad digestion; of scrophula, or other glandular affections; and even of eventual consumption, at the age of puberty.

WEASEL, the COMMON, or *Mustella vulgaris*, L. a diminutive animal of prey, frequenting barns, granaries, and out-houses: its body seldom exceeds 6 or 7 inches in length, and the legs are remarkably short.

Weasels propagate in the summer, when they retire to low grounds, near mills; and either conceal themselves among brushwood, or in old willows; the female producing from 6 to 8 young

ones, that are blind at first, but soon acquire their sight, and are enabled to join their parents in nocturnal depredations....Like the POLECAT, and FERRET, weasels emit a very offensive odour; and, though of a diminutive size, they are formidable enemies to many larger animals. Among rabbits, poultry, and young birds, weasels commit extensive depredations, and they likewise devour incalulable numbers of eggs. But to counterbalance, in some measure, these depredations, they also destroy many noxious animals, such as rats, mice, and moles.

The following method of entrapping weasels has often been practised with success: It consists of a wooden box, or hutch, resembling the kennel usually provided for a house-dog; but it is divided in the middle by an open wire-partition, extending from one end to the other; and being again separated into two cages, one of which may be baited with a tame rabbit, and the other with a live fowl; while the remainder of the hutch may be formed into a falling box, for securing the depredator. This trap may be placed in coppices, and hedge-rows.....See also MARTIN.

WEASEL-SNOUT, YELLOW ARCHANGEL, or YELLOW DEAD-NETTLE, *Galeobdolon luteum*, L. is an indigenous perennial, growing in woods, shady places, and moist hedges; blowing in the month of May. The flowers of this plant afford to bees an abundant supply of honey.

WEATHER, a term denoting the state of the atmosphere, with respect to HEAT, COLD, HAIL, RAIN, SNOW, &c.

Having already discussed, in the course of this work, the phenomena of the meteors above mentioned, we shall at present communicate a few simple rules, which may serve to prognosticate the weather, or to ascertain its future variations, with tolerable accuracy. For this purpose, Mr. KIRWAN ("*Transactions of the Royal Irish Academy*," vol. v.) has laid down the following plan, from observations that had been made in England, during a period of 112 years; namely, from 1677 to 1789.

1. When no storm has either preceded or followed the vernal equinox, the succeeding summer is in general dry, or at least so, five times out of six.

2. If a storm happen from an easterly point, on the 19th, 20th, or 21st day of May, the ensuing summer will, four times in five, be also dry....The same event generally takes place, if a storm arise on the 25th, 26th, or 27th days of March, in any point of the compass.

3. Should there be a storm, either at south-west, or at west-south-west, on the 19th, 20th, 21st, or 22d of March, the following summer is *wet*, five times out of six.

In England, if the winters and springs be dry, they are mostly *cold*; but, if moist, they are generally *warm*; on the contrary, dry summers, and autumns, are usually *hot*; as moist summers are *cold*. Thus, if the humidity or dryness of a particular season be determined, a tolerably correct idea may be formed respecting its temperature......To these indications may be added the following maxims; which, being the result of observations made by accurate inquirers, may so far be depended

upon, as they will afford a criterion of the mildness, or severity, and of the dryness or moisture, of future seasons.

1. A moist autumn, succeeded by a mild winter, is generally followed by a dry and cold spring; in consequence of which, vegetation is greatly retarded.

2. Should the summer be uncommonly wet, the succeeding winter will be severe; because the heat or warmth of the earth will be carried off by such unusual evaporation. Farther, wet summers are mostly attended with an increased quantity, of fruit on the white-thorn, and dog-rose; nay, the uncommon fruitfulness of these shrubs is considered as the presage of an intensely cold winter.

3. A severe winter is always indicated by the appearance of cranes and other birds of passage, at an early period in autumn; because they never migrate southwards, till the cold season has commenced in the northern regions.

4. If frequent showers fall in the month of September, it seldom rains in May; and the reverse,

5. On the other hand, when the wind often blows from the south-west, during either summer or autumn; when the air is unusually cold for those seasons, both to our sensations, and by the thermometer; at the same time, the mercury being low in the barometer: under these conditions, a profuse fall of rain may be expected.

6. Great storms, rains, or other violent commotions of the clouds, produce a kind of crisis in the atmosphere; so that they are attended with a regular succession, either of fine or of bad weather, for some months.

Lastly, an unproductive year mostly succeeds a rainy winter; as rough and cold autumn prognosticates a severe winter.....See also the article CLIMATE.

WEATHER - GLASS, or STORM-GLASS. An ingenious contrivance of this nature has lately been announced by WIEGLEB, in Germany; and the invention of it is likewise claimed by Mr. FRANCIS ANONE, of High Holborn: it consists of a glass tube, containing a liquor that holds in solution a compound substance, the transparency, or turbid appearance of which, indicates the changes in the atmosphere. Thus, if the weather promise to be *fine*, the solid matter of the composition will settle at the bottom of the tube, while the liquid is pellucid; but, previously to a change for rain, the compound will gradually rise; the fluid will continue transparent; and small stars will be observed moving or floating about the glass.

Twenty-four hours before a storm, or very high wind, the substance will be partly on the surface of the liquid, apparently in the form of a leaf; the fluid in such case, will be very turbid, and in a state resembling fermentation.

During the winter, small stars being in motion, the composition is remarkably white, and somewhat higher than usual, particularly when white frosts, or snow prevail. On the contrary, in the summer, if the weather be hot and serene, the substance subsides closely to the bottom of the glass tube.

Lastly, it may be ascertained from what point of the compass the wind blows, by observing that

the solid particles adhere more closely to the bottom, on the side opposite to that, from which the tempest happens to arise....This instrument has been satisfactorily employed both at sea and on shore: being small, portable, and tolerably exact, it may often serve as a substitute for the more bulky and expensive contrivances in common use....See also BAROMETER.

WEAVING is the art of working a web of linen, silk, wool, or any other material, by means of looms.

Having, in the article CLOTH, given an outline of the manner in which weaving is performed, we shall at present notice two improvements that have lately been introduced in this important branch of our staple-manufacture.

The first is, Mr. ROBERT MILLER's method of weaving all kinds of linen, woollen, or other stuffs, by means of looms worked by water, steam-engines, or horses; for which he obtained a patent in June, 1796.....Our limits not admitting of diffuse accounts, which would also require the aid of engravings, we refer the reader to the 8th vol. of the "*Repertory of Arts*," &c. where the specification is illustrated with two plates.

In the year 1800, the *Society for the Encouragement of Arts*, &c. conferred a bounty of 15 guineas on Mr. THOMAS CLULOW, for his invention of a loom, designed to weave *figured* ribbons. The great advantage attending the use of this machine is, not only a considerable saving of time, but ribbons may thus be woven with greater neatness, and beauty, than by the common looms: the work being necessarily stopped in the latter, while the figure is formed by the hand; whereas, by Mr. C.'s contrivance, the *tire-cords*, or those which trace such outline, without retarding the progress of the work, are acted upon by straps affixed to the centre treddle. A farther account of this useful improvement, will be found in the 18th vol. of the Society's "*Transactions*," &c. See also article LOOM.

WEED, a term applied to all rank, coarse vegetables, that grow spontaneously, to the detriment of other plants.

Weeds are usually divided into two classes, namely, *annual*, and *perennial*. With a view to eradicate the former, it will be advisable to plough them up, shortly before their seeds are formed, or at least previously to their attaining to a state of maturity.....The small seeds of weeds, that are separated in winnowing grain, ought to be carefully burnt; because, when thrown upon dung-hills, and afterwards spread on land among manure, they vegetate with increased luxuriance.

Perennial weeds are exterminated with the greatest difficulty; as they strike very deep root. The usual method of extirpating them, is that of bringing them to the surface by the plough; after which they are gathered by hand: but, as this mode is very expensive, it will be more advantageous to cut them half-through, about the middle of June, or when they are in full vigour: for the sudden interruption of their circulating sap, causes that fluid to stagnate in the roots; in consequence of which the plant generally perishes: thus, such weeds may be collected by means of Mr. SANDILANDS' *Wrack-Har-*

row, (see vol. iii. p. 252) then burnt, and strewed on the land by way of MANURE....See also vol. iv. p. 32.

Weeds often abound in the beds of navigable canals and rivers. As their eradication, however, is tedious, and sometimes occasions considerable expense, M. DE BETANCOURT MOLINA, in 1796, presented to the *Society for the Encouragement of Arts*, &c. a model of a machine designed to mow or cut them, so that they may then be carried down with the stream; or, if the current be not sufficiently rapid for that purpose, they may be collected on the surface of the water, and employed as manure. For this contrivance, he was rewarded with the premium of forty guineas; but, as a plain description would not convey an adequate idea of the principles on which it is constructed, we refer the reader to the 14th volume of the "*Transactions*" of that Society, where a complete account is inserted, and illustrated with an engraving.

["Operations" says Dr. ANDERSON, "may be conducted either so as to be calculated for the extirpation of weeds *in general*, without having a view to any particular class of weeds; or, as being calculated, in an especial manner, for the extirpation of some particular class of weeds, such as,

1. Weeds that spread by the root, and are chiefly propagated in that way, viz. *a* docks, perennial; *b* dandelion, this also spreads greatly by seeds; *c* hemlock, this also; *d* colts-foot; *e* crow-foot; *f* perennial convolvulus; *g* wild liquorice; *h* perennial lychnis; *i* couch-grass; *k* lion's-tongue; *l* horse-tail (*equisetum*); *m* nettles, &c.

2. Shrubs and perennial weeds, that increase chiefly by seeds...... Of this description the following are those that chiefly abound in this country, (England) viz. *a* furze, goss, or whins; *b* broom; *c* heath; *d* brambles; *e* briars; *f* docks; *g* dandelion; *h* hemlock; *i* wild carrot; *k* narrow leaved sorrel, &c.

3. Biennial plants. The most common of these are, viz. *a* ragwort, *b* rattle, *c* narrow leaved dock, *d* biennial thistle, *e* hemlock, &c.

4. Annual weeds that are propagated by seeds only, viz. *a* wild oat, *b* charlock, *c* corn poppy, *d* spurry, *e* chickweed, *f* annual solanum, *g* annual ragwort, *h* annual thistles, &c.

5. Aquatic plants, viz. *a* rushes, *b* flags, *c* reeds, &c.

6. Moss, as affecting pastures, lichens, and other plants of the cryptogamia class, as affecting trees and perennial plants, misletoe, and other parasitical plants, &c."

Mr. DEAN, ("N. England farmer") in order to destroy weeds, directs "the land to be employed in hoed crops for two or three years in succession, not omitting autumnal weeding. A crop of peas, or any crop that forms a close cover to the surface may do much." A crop of the *Cassia Chamæcrista*, (which see) would answer very well. Mr. DEAN adds "if all other methods were to prove ineffectual, laying tillage-land down to grass, and sowing it with cleaned grass-seeds, will not fail."]

WEEVIL. See CORN-CHAFER.

[The Society of Meaux in France

has invited all those who may think proper to make use of the following very simple method of preserving grain from Weevils and other insects, to communicate the result of those trials.

Soak cloths, made of flax, in water, wring them, and cover your heaps of grain with them: in two hours time you will find all the Weevils upon the cloth, which must be carefully gathered up, that none of the insects may escape and then immersed in water to destroy them.

A plant of henbane, placed in the middle of a heap of corn, drives them away: in this case, it is necessary to watch and crush them as fast as they come out, which they do in a short time....See also vol. iv. p. 492.]

WEIGH, or WEY, a species of provincial English weight, employed for cheese, wool, &c.: it contains 256lbs. avoirdupois. A *weigh* of corn should comprise 40 bushels; that of barley or malt, amounts to 6 quarters; but in Essex, and some other counties, a *weigh* of cheese consists of 300lbs.

[WEIGHTS to raise....In buildings, heavy stones and timbers are often required to be raised, which require many men. The annexed plate represents an elevation and section of a simple and very effectual contrivance, for the purpose of saving labour, which has been used with great success in Philadelphia.

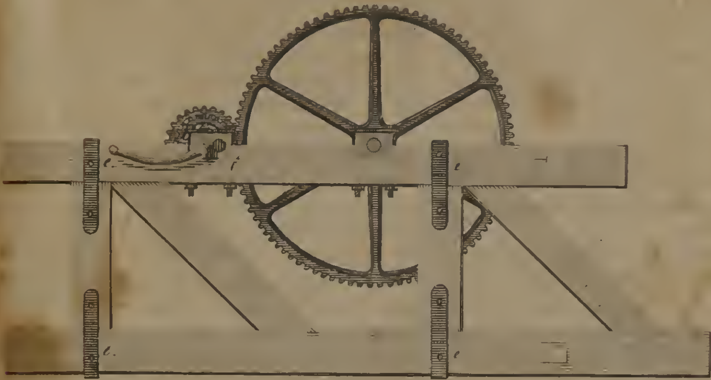
The letters, *a*, *b*, *c*, *d*, represent the frame of this machine, which is 10 feet long, by 5 feet wide, and made of 3 inch. by 7, white oak scantling, well pinned and strapped together, (*e e e e*, in elevation.) There are six wheels,....2 of which are 4 feet....2 of 1 foot....and 2 of 8 inches diameter on the pitch lines, by $2\frac{1}{4}$ inches thick, the cogs are about $\frac{3}{4}$ of an inch thick. As the 4 small wheels are *fixed* on one axle, it is therefore made to move sidewise occasionally as the smallest *, or second sized wheels are used......there is necessarily a double set of bushes for this axle (*f*, in elevation,)....for when the small wheel is used, it must be moved two inches (or half the difference in diameter between the small wheels) up to the large wheels. The rope being guided by snatch-blocks, the machine is made to act upon buildings, vessels, &c....The lower part of the frame is floored, that it may be *loaded* to prevent its being dragged, stakes are also driven in the ground for this purpose.

There is nothing new in this machine but its application to the erection of buildings. Mr. LATROBE architect, and engineer, introduced it at the erection of the new building for the Pennsylvania Bank, and in the buildings of the Water-Works, for the purpose of hoisting the heavy materials used in their erection, particularly marble.

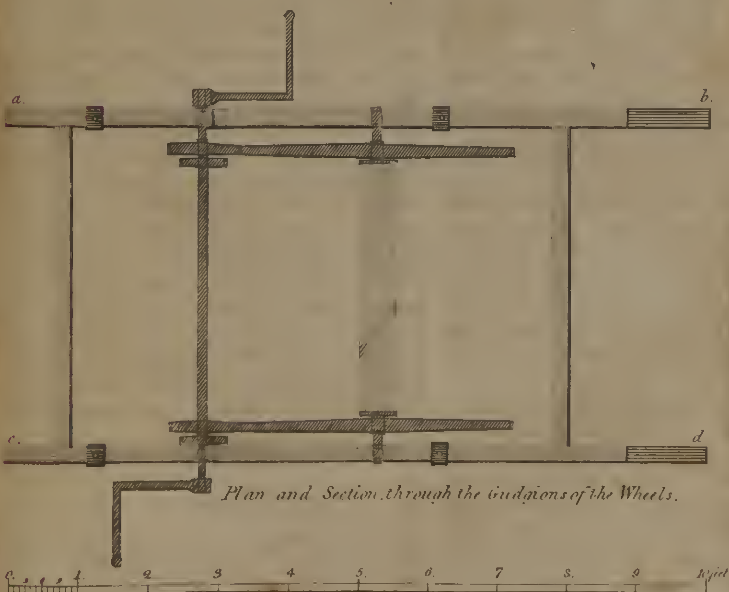
In that part of the roof of the Pennsylvania Bank, which is of marble, there are several blocks of from 5 to $7\frac{1}{2}$ tons weight, the heaviest of which were hoisted by two of these machines, and *eight* men, in the short space of fifty-five minutes. And the columns of the Centre Square Engine House, which weigh about 9 tons each, were set by the same force. The same kind of machines were em-

* The smallest wheel is used when the utmost power of the machine is required.

HOISTING MACHINE.



Elevation.



Plan and Section through the Gudgions of the Wheels.

Traquair del.

ployed in lowering the most weighty stone used in the piers and abutments of the Schuylkill Permanent Bridge, as well as in unloading the shallops employed in transporting large stones from the different quarries.

Single machines (having wheels on one side only) are sufficiently powerful for common purposes. They are in many respects preferable to walking capstans, cranes, &c. &c.]

WEIGHT, denotes a method of ascertaining the quantity of any solid or fluid body, by means of the balance, or otherwise.

Having already stated, in the articles AVOIRDUPOIS, TROY-WEIGHT, CLOVE, &c. the different weights used in England, we shall only remark, that various statutes have been enacted, with a view to regulate the uniformity of weights and measures; but the wisdom and accuracy of those laws have not yet produced the desired effect; and so prevalent is the force of habit, that the old weights are still employed in many parts of the kingdom, to the great detriment and confusion of commerce..... Hence, ingenious mathematicians have proposed various schemes for introducing a more uniform scale in weights and measures; the principal of which are the following:

In the year 1779, the *Society for the Encouragement of Arts*, &c. conferred a bounty of 30 guineas on Mr. THOMAS HATTON, for his "*Attempt to find, by Approximation, an Universal Standard.*".... Mr. H.'s plan consists in applying a moveable point of suspension to one and the same pendulum, in order to produce the full effect of *two* pendulums, the difference of the length of which, is the intended measure. An abstract of Mr. HATTON's memoir, will be found in the 1st vol. of the Society's Transactions. Several years having elapsed without his suggesting any farther improvement, Mr. WHITEHURST proposed, in 1787, "An attempt towards obtaining an invariable measure, length, and capacity, from the mensuration of time; independently of the mechanical operations, necessary to ascertain the true length of pendulums." In short his contrivance is founded on Mr. H.'s apparatus, in an improved state; and the inquisitive reader, who is desirous of farther information, will consult Mr. W.'s elaborate essay (4to. 5*s*. Bent); the title of which has before been specified.

Numerous abuses, relative to *weights* and measures, are also stated, with appropriate remedies, in the late Sir JOHN RIGGS MILLER's "*Speeches in the House of Commons, upon the Equalization of the Weights and Measures of Great Britain*," &c. (8vo. pp. 128, 2*s*. 6*d*. Debrett, 1790);....in the late Sir JAMES STUART's "*Plan for introducing an Uniformity in Weights and Measures, within the Limits of the British Empire*" (8vo. pp. 64, 1*s*. 6*d*. Stockdale, 1790);....and in Sir GEORGE SHUCKBURGH EVELYN's Memoir, inserted in the "*Philosophical Transactions of the Royal Society*," for 1798.....As, however, a specification of their different plans, would be incompatible with our limits, we shall give our readers an account of the *new French weights and measures*; because they frequently occur in translations of works from that language.

The principal measure of length is the *metre*, which is equal to 39.404 English inches: it is mul-

tiplied by perfixing the Greek numeral adjectives to the word metre: thus, the *Decametre* signifies 10 metres; *Hectometre*, 8; *Kilometre*, 1000; and *Myriametre*, 10,000 metres. The measures below a metre, are named in a similar manner; the Latin numeral adjectives being substituted for those of the Greek: hence, a *decimetre* denotes the tenth part; *centimetre*, the hundredth part; and *millimetre*, the thousandth part of a metre.

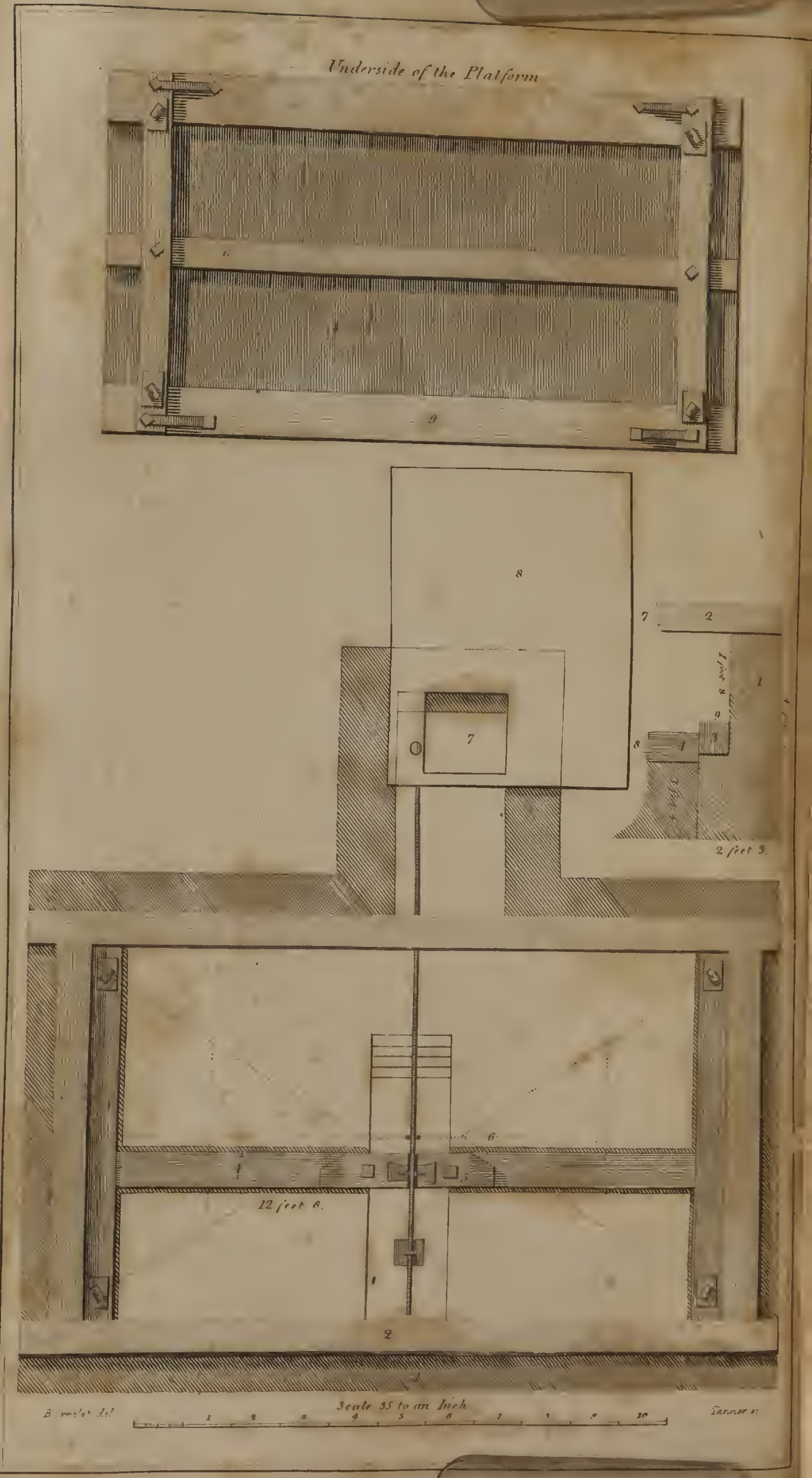
The standard measure of capacity is denominated a *Litre*, which is equivalent to 61.1816 English *cubic* inches, or about 1, 5-7th of a pint, ale-measure, and 2, 1-10th of a pint, wine measure. Its multiplication, and sub-multiplication, are performed in a similar manner.

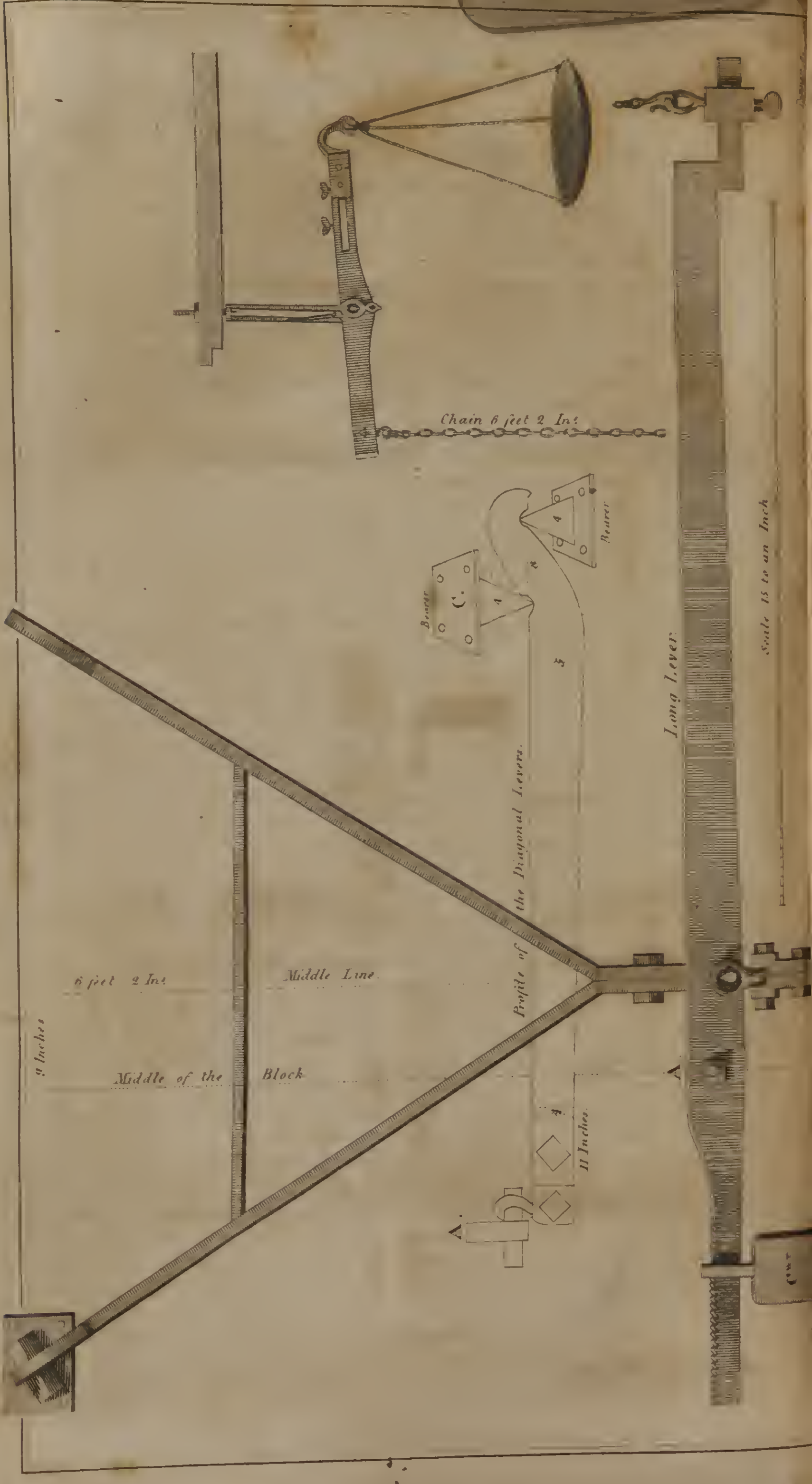
The *Gramme* is adapted to weighing bodies, and is equal to 15.4457 English grains, Troy-weight. Its divisions, and sub-divisions, correspond with those of the metre.

The French *are* is employed for measuring the superficies of land, and is equal to 1076, 2-5ths square feet, or 119, 3-5th square yards, or about one-fortieth part of an acre. Lastly, the *Stere* is used in measuring wood for fuel: it is equal to 35.31467 cubic feet.

A Comparative table of the Unities of the French Metres, Litres, and Grammes, with their corresponding English Inches, Gallons and Grains.

French Measures.	METRES in English Inches.	LITRES in English. Cubic Inches.	Ale gallons, of 282 Inc.	Wine Gallons, of 231 Inches.	GRAMMES in English Grs. Troy.
1	39.404	61.1816	0.21695	0.26485	15.4457
2	78.808	122.3632	0.43390	0.52970	30.8914
3	118.212	183.5448	0.65085	0.79455	46.3371
4	157.616	244.7264	0.86780	1.05940	61.7828
5	197.020	305.9080	1.08475	1.32425	77.2285
6	236.424	367.0896	1.30170	1.58910	92.6742
7	275.828	428.2712	1.51865	1.85395	108.1199
8	315.232	489.4528	1.73560	2.11880	123.5656
9	354.636	550.6344	1.95255	2.38365	139.0113
10	394.04	611.816	2.1695	2.6485	154.457
20	788.08	1223.632	4.3390	5.2970	308.914
30	1182.16	1835.448	6.5085	7.9455	463.371
40	1576.16	2447.264	8.6780	10.5940	617.828
50	1970.20	3059.080	10.8475	13.2425	772.285
60	2364.24	3670.896	13.0170	15.8910	926.742
70	2758.28	4282.712	15.1865	18.5395	1081.199
80	3152.32	4894.528	17.3560	21.1880	1235.656
90	3546.36	5506.344	19.5255	23.8365	1390.113
100	3940.4	6118.16	21.695	26.485	1544.57


Underside of the Platform
9
8
7
2
1
7
4
8
2 feet 3.
6
12 feet 8.
2
Scale 35 to an Inch
1 2 3 4 5 6 7 8 9 10



Chain 6 feet 2 In.
Bearer
Bearer
Long Lever.
Scale 15 to an Inch
Profile of the Diagonal Levers.
Middle Line.
6 feet 2 In.
9 Inches
Middle of the Block
11 Inches

From the table here given, the English weights and measures, corresponding with those used in France, may be easily ascertained, by multiplying the *hundreds*, and adding the tenths and units, as circumstances may direct; or, if the number be less than one hundred, by adding the units to the tens. After the number required is thus found, it may be reduced to English feet, or inches; to quarts or pints; to pounds, ounces, drams, or grains, by means of the common rules of arithmetic.

A more ample specification of these weight and measures is published in the 3d vol. of Mr. NICHOLSON's "*Journal*;" and which is abstracted from a report published in 1799, at Paris, by authority of the French government.

In the year 1791, the *Society for the Encouragement of Arts*, &c. gave a bounty of 20 guineas to M. HANIN, of Paris, for his *weighing machine*; in which the weights of the principal countries of Europe, together with their relative differences, may be ascertained at one view: as a description of this contrivance would be unintelligible, without the aid of engravings, we refer the reader to the 9th vol. of the Society's "*Transactions*," &c. which contains a complete analysis of the subject, illustrated with two plates.

[WEIGHING-BRIDGE. The annexed plates represent two views of the WEIGHING-BRIDGE, erected by the Lancaster turnpike company at the first gate, and which for expedition, far exceeds the common cumbrous scales and weights. Its accuracy is also superior to the latter mode, as the common weights suffer considerable friction by rolling off and on the bridge, while in the new mode, it is only necessary to put into a small scale (connected with the long lever on which the bridge lies) certain weights adjusted to other heavy weights passing over the bridge, so that scarcely half a minute is required to weigh any waggon.

The model was sent over by JOSHUA RINGROSE, but the contrivance is said to be in general use in England. Drawings were taken from the model, by permission of the managers of the Lancaster turnpike company.

Plate 1. Directions for the brick and timber work, by a scale of 35 to an inch.

Plate 2. Directions for the different levers and iron work, by a scale of 15 to an inch.

The first step is to dig a cellar 16 feet long, by 10 feet broad, six feet ten inches deep, to allow head room, to repair the machine.

The brick or stone walls are to be 18 inches thick, the flank wall two feet three inches in the foundation, until the wall is raised to a height of four feet, to receive No. 3, (the timbers for the diagonal levers) nine inches broad and seven inches thick, seven feet four inches long.

The inside of the wall remains 13 feet long by seven feet four inches wide.

No. 4. The wall for the long lever, three feet nine inches high, one brick and a half thick, at two feet six inches distant from the back wall No. 2, on which is placed the long lever timber, ten inches broad, and eight inches thick, 12 feet long. Continue to raise the wall one foot eight inches, over the diagonal timber, to lay the upper frame No. 2, of eight inches wide, and seven inches thick, 16 feet

long, the end pieces eight feet eight inches including mortises.... This frame receives the platform.

No. 9, The platform, 13 feet long, by seven feet two inches broad, two feet thick.

The joice one foot square outside.

The middle No. 6, six inches and one foot deep.

The cross piece eight inches square.

The planks for the floor four inches thick.

The platform is thus made two feet thick.

The lower timbers are laid on when the brick work is at the proper height, and are to be filled up with the brick work to the upper side; then the iron bearers are to be let in and screwed on in the following manner. Nail a piece of wood marked 5, about five inches in height, find the centre each way, make two centres on the longitudinal line three inches and a quarter apart on the lines 5 and 6, and provide a rod with a square end, and an awl hole six feet nine and a quarter inches from the end..... Screw the diagonal levers together by their prick-punch marks, and with a rod take the distance from the middle of the dyes in each lever, which rod lay the middle of the bearers, then apply the former rod until the end comes on the edge of the bearer. The same is to be observed in fixing the bearers on the under side of the bridge or platform of the engine; only the rod made use of is to be six feet one and a half inches in length, and the temporary block No. 5, eight inches and a half deep.

To adjust the machine. This must be done by trials: that is, when the platform and scale are brought to an equilibrium by the two counterpoises, viz. the stone (about 2cwt. with an iron eye run in with lead,) at the end of the long lever, and the sliding brass in the beam, put a few 100 wts. on the platform, and their counterpoises in the scale, that is, some of the brass or iron weights which are properly marked, and if it is not exact, move the sliding box at the end of the long lever until you restore the equilibrium; then take the weights from the bridge and scale, and repeat the operation, for it will be found that they vary by moving the box and rod. It will be necessary to leave the piece on which the beam is suspended, until the engine is adjusted, in order that the rod may be perpendicular, and then to fasten it.]

Welch Bistort. See Bistort, the small.

Weld. See Dyer's-weed.

WELL, a cavity, dug in the ground, with a view to collect the water from the contiguous strata: it is generally of a circular form, and lined with brick or stone.

The following method of procuring water, in almost every situation, has lately been suggested by M. Cadet de Vaux. He directs the soil to be perforated with a borer: a wooden pipe is then to be placed in the hole, and driven down with a mallet, after which the boring must be continued, in order that a pipe may be driven to a greater depth. As the auger becomes filled with earth, it ought to be drawn up, and emptied; so that, by the addition of fresh portions of the pipe, the boring is carried to a considerable extent under ground, and water is in most instances obtained. Wells, thus

formed, are preferable to those dug in the usual manner; being less expensive, while the supply of water is more copious and certain. Indeed, it often happens, in the common practice of digging for wells, that the workmen are obliged to fix the windlass, in order to prevent the springs from gaining on them: by this practice, a small quantity of water is the necessary consequence, and it is apt to fail during dry summers. Hence, M. De Vaux advises the earth to be perforated; a cylindrical pipe to be inserted; and to search for that element at a greater depth, in the manner before suggested. This method is stated to be very useful in camps, or fortresess; and, in case the fluid near the surface be neither sufficiently sweet, nor of a good quality, he supposes this expedient to be the best that can be adopted, for obtaining water of a purer kind, at a greater depth.

[The above plan would be highly useful in the limestone counties of Pennsylvania, particularly in Northampton, and the dry lands of Cumberland, where the inhabitants have been obliged to dig from 90 to 150 feet deep for water. The utility of the plan has lately been shewn at Nazareth in Pennsylvania, where in boring for coal, a spring of water issued, which now continues to run freely.]

Farther, when wells have, in large towns, been rendered unfit or useless, in consequence of the ground having been tainted by privies, church-yards, &c. he very properly recommends such reservoirs to be emptied, and the bottom perforated in a similar manner, so as to reach the lower sheet of water; which, being thus contained within the cylindrical pipe, will rise in a pure state into the body of the pump fixed for this purpose.

If wells be disused for a considerable time, the water generally becomes foul; the ambient atmosphere is corrupted; and thus arise mephitic vapours which have often proved fatal to animal life. Hence it has been suggested, to employ a pair of smiths bellows, and a tube, according to the manner directed in the article Vapour; but, as these are two bulky to be conveniently carried to any distance, and frequently cannot be procured on the spur of the occasion, Mr. Salmon, of Canterbury, has invented the following aparatus, for dispersing noxious air from wells..... We are induced to recommend this ingenious contrivance to the notice of our country readers; as it is not very expensive, and will prevent many fatal accidents.

A, B, C, D, E, F, represent six *lengths* of a metal pipe, each being eight feet long, and two inches in diameter: all these joints (excepting that marked F, which is made of copper, for the better support of heat), are manufactured of tinplate.

G, is a tin-kettle, or vessel (containing about two gallons), that is fastened to the upper pipe F, and the sides of which are perforated for the admission of air, and consequently for supporting the fire. This vessel must be fixed in such a direction as to have at least five feet of pipe above its top.

H, is a conical cap, designed to confine the heat to the sides of the tube.

When the machine is applied to the well, a wire must be passed through the holes *a*, *a*, in the upper part of the *length* A, and in the

lower extremity of B; the joint ought to be luted with *oil-putty*, to render it air tight; the upper end of each joint should be covered with wire, to prevent it from bending; and to form a receptacle for the putty. The other lengths are then to be managed in a similar manner, till that marked A, reach nearly to the surface of the water. The vessel G, ought to be placed on two pieces of timber laid across the well.

The aparatus, being now fixed, will speedily be filled with the foul air extracted from the well: and, as the gravity of the external and internal air, is equal, they become stationary. Burning coal or wood must next be put into the kettle G; by which the copper tube, F, is heated; and, the internal air being rarefied, while the external air presses downward, the noxious vapours are gradually dissipated; and a purer element is introduced into the well, whence it issues during the continuance of the fire.

Mr. SALMON remarks (in his communication, inserted in the 9th volume of the "*Repertory of Arts*," &c.), that however small the current of air passing out of the funnel or pipe, F, may appear, the effect is considerable; because such discharge consists whollyofnoxious vapour; whereas, ten gallons of fresh air are probably blown into the well, by means of the common bellows and leather pipe, before two gallons of mephitic vapour are removed. Such purification will be still more effectual, if the fire-kettle, G, be placed at D, when the internal air becomes more rarefied: it ought, however, to be remarked, that this advantage is over-balanced by the atmosphere being rendered unfit for respiration, in consequence of the suffocating properties of the charcoal.

[The following plan recommended in the *Columbian Magazine*, for 1789, may be found useful and even preferable to the above, in some cases. Let a stove, with a hole made in it, for an extra pipe, be placed near the mouth of the well, so as the lower end may be near the bottom of the well; fix

the other end of the pipe in the stove; then make a brisk fire in it, and as the bad air comes from the well to the stove, and from thence through the pipe that conveys the smoke, fresh air from the mouth of the well, will supply its place. A coal-pit in England was cleared of noxious vapours, by a method nearly similar to that here recommended: a pot being used instead of the stove. A constant rule should be, to lower down a candle before any workman descends: if it burn clear, there is no danger; but if it go out, we may be sure of the presence of fixed air, or suffocating choke damp.

The following easy method of expelling the foul air from wells, was pursued with success by Mr. ROBERT PATTERSON of Philadelphia. It is much more practicable than that of Mr. ROBERTSON, noticed under the articles, AIR, VAPOUR.

He took a hoop a little less in diameter than that of the well, to which he fastened a piece of cloth, nearly in form of a scoop net.... Three cords were made fast to the hoop at equal distances from each other, each about the length of the diameter of the hoop and knotted together. This vessel was let down to the bottom of the well, by a strong line over the windless, which was placed directly above the center of the well; he took hold of it with his hand, and running from the well's mouth, forcibly drew up the vessel, with the whole volume of incumbent air. Two or three repetitions of this simple process, completely cleared the well of all its noxious air, and the workmen descended with safety. The experiment has been frequently repeated, and always with equal success.

Mr. LATROBE mentioned to the Editor, that he frequently saw an experiment tried in England founded upon the same principle as that of Mr. PATTERSON'S. A rope was fastened to a bush of furze, and let down the well; a person then having laidhold of the rope, run quickly back from the well, forcibly drawing up the furze bush, and causing a current of air after it, and thus forcing up the deadly vapour.

Another successful method, is to lower down a dish into the well, containing quick-lime, in a state of effervescence. The carbonic acid (fixed air) seizes greedily upon the quick-lime, and leaves the space it formerly occupied, to be filled with the common atmospheric air. Repeatedly dashing buckets of water down the well, also dissipates the fixed air.]

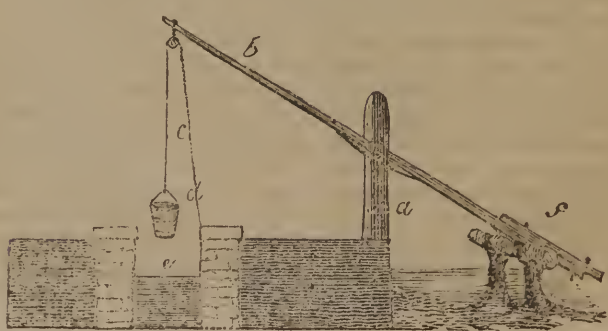
In the year 1794, the *Society for the Encouragement of Arts*, &c. conferred their silver medal on GEORGE BUTLER, Esq. for his invention of a *Bucket for drawing water from deep wells.* It consists of a common barrel, the head of which is taken out: across the top are fixed two thin bars of iron, having in the centre a small piece of the same metal, which Mr. BUTLER terms a *standard.* This is furnished with a collar, which has 4 moveable arms; and above it, there are a mortise containing a small brass pulley, and a loop, to which the well-rope is secured: farther, a cord is tied to one extremity of the collar, which, after passing over the pulley, communicates with a valve applied to the lower head of the vessel.......The bucket, thus constructed, when let down into the well by a rope, is filled through such valve; and, on being drawn up, the iron cross

above mentioned is passed against two parallel bars, so that the valve is opened, and the water discharged into a trough, or vessel, prepared for its reception.....The principal advantage, arising from this contrivance is, that the bucket is not only filled expeditiously, but it is also brought up steadily, so that no water is spilt; and, if any of it accidentally drop, it falls directly from the valve into the well, without wetting the descending rope; a circumstance of considerable importance; for, by such continual moisture (which is necessarily occasioned by the common buckets), it speedily decays, while the vessels are seldom drawn up completely filled. A more minute account of Mr. B.'s invention will be found in the 12th volume of the "*Transactions*" of the Society above mentioned, where it is illustrated, with an engraving.

A patent was granted in August, 1798, to Mr. JOHN ASHLEY, of Islingtom, for a method of raising water from wells of any depth, upon a very simple and permanent construction; of which, however, we have not met with a specification.

[The following simple and convenient mode of constructing what is called in the U. States, *Sweep*, the editor is favoured with, by Mr BENJAMIN DEARBORN, to whom it was shewn by some person whose name he forgets. In convenience it is superior to the common kind, as the bucket, when this is fixed, is drawn double the perpendicular distance which the end of the sweep moves where the pulley is fastened. Its simplicity is such, that the only remark necesary to make is, that one end of the cord is to be fastened inside of the well, at or near the top. The contrivance in other respects, consists of a strong post, firmly set in the ground, at a small distance from the well, and which is about eight feet above the surface of the earth, as represented at *a*....With the top of this post is connected a *baulk*, *b*, that turns on an iron pin;.....*c* is a pole, linked to the smaller end of each baulk, and on which the pail *d* is suspended, that swings when empty over the well *e*.

In order to raise water by the apparatus here described, a person lays hold of the pole, which is pulled down till the bucket descends into the well for filling it; when it is again easily lifted upwards by a small force at *c*, being assisted by the weight delineated at *f*.



WEN, is an indolent tumor, or an enlargement of the thyroid gland, which is situated in the anterior part of the neck. This affection frequently occurs, and is endemial in some parts of England; for instance, in Derbyshire. It is uncommonly prevalent among the inhabitants of marshy, low countries, surrounded by woods, bordering on rivers and standing waters, or exposed to southerly, hot winds; and especially among females, young people, children, and persons of a delicate or tender habit: even strangers, who settle in these parts, are not exempt from its attacks. Nevertheless, if timely attended to, it is often cured; but, where it is hereditary, or has been suffered to remain *after* the age of adolescence, its removal is extremely difficult.

The principal *causes of wens*, are scorphulous matter; violent exertions; poor, or indigestible food; and bad water. Several authors suppose it to arise from the use of snow-water: thus, FORSTER, in his voyage round the world, observed glandular obstructions to originate from drinking solutions of ice.

Cure....Where this malady proceeds from a vitiated lymph, as in the SCROPHULA, it will be necessary to have recourse to the treatment recommended under that article. Should it have been induced by frequently taking solutions of ice, or snow, great benefit may be derived from the use of water, saturated with fixed air..... With a view to dissolve the tumor, various remedies have been devised; of which the following deserve particular notice: Electricity in conjunction with alteratives; for instance, mild mercurials and antimonials; hemlock; or 30 grains of the liver of sulphur dissolved in a quart of water, 2 table-spoonfuls of which are to be taken every 3 hours. During such course, Peruvian bark, or other tonics, ought to be used as auxiliaries. Among external remedies, camphor combined with sweet-oil; or a solution of sal-ammoniac in vinegar, have often successfully been applied to the tumor.

Internally, the use of *burnt sponge* (as directed in the article SCROPHULA) has been attended with the best effects, in dispersing wens.

[The following prescription is warmly recommended by the respectable Mr. J. RING of London, who says, "He has been very successful in the cure of *bronchocele* with it.

"Take of burnt sponge 2 oz.: powder of gum arabac 2 dr.: cinnamon ½ a dr.: simple syrup a sufficient quantity to make 24 lozenges. The mass is to be well beaten, and the syrup added slowly. The lozenges are to be dried before the fire, on a plate that has been slightly oiled, or in a gallipot, tied over with skin. One of them is to be taken twice or three times a day. Mr. RING says, he knew an instance, where one was taken twice a day, for a great length of time, to no purpose; but when the number was increased to three, the good effect was soon evident. The *bronchocele*, or goitre, as this disease is called, prevails in several parts of the United States, particularly in the western part of Pennsylvania, and in the Genesee district of the state of N. York. It also prevails in Canada to an alarming degree. The above prescription deserves the attention of sufferers by the complaint.

Wens frequently make their appearance in the side of the cheek, or the back of the neck. To remove these, the mere bathing with salt and water has been found effectual, as the following account shews.

From the Gentleman's Magazine.

Chisholme, *Roxburgshire*, *November* 20, 1799.

Mr. Urban,

Having had a wen of the steatomatous kind, of large size, and long standing, upon the side of my face, immediately before and below my right ear. I was informed by different people that, if I would apply salt and water to it, I would get rid of it. In August, 1798, I put a quantity of salt and water in a saucepan, and boiled it for four minutes, with which I bathed the whole surface frequently while it continued warm, as also after it became cold, so often as ten or twelve times daily; always stirring up the salt deposited at the bottom of the bason, and incorporating it again with the water, before I applied it. On the 11th day from the first application, while shaving, I observed a small discharge; while assisting by a gentle pressure, the whole contents were soon emptied, without the smallest pain, and without blood.

Being informed of some others who had been benefitted in like manner from the same application, and knowing myself of some late instances under my own immediate direction, I feel it a duty thus to make it public; being convinced it can produce no bad effect, and every person having it in his power to make the trial. At the same time, I beg leave to caution that no one should be disheartened from the length of time it may be necessary to continue the application; as, in some cases, it has required 3 or 4 months, though in the last, only thirty days; but in all, without pain or inconveniencies of any kind, or any previous notice of the discharge, till it actually took place.

William Chisholme.]

WHALE, the Common, or *Balæna mysticetus*, L. is the largest inhabitant of the ocean, frequenting the north-seas, where it is from 70 to 90 feet, and in those of the Torrid Zone, to 160 feet in length. Its head is uncommonly large, so that it is equal to one-third of its length: in the middle are two orifices, through which it spouts water to a considerable height; and towards the back, there are two small eyes, protected by eye-lashes, like those in quadrupeds. The tail has the form of a crescent; and the colour of the whole body is various, the backs of some being red, and the belly perfectly white. The female produces one, or not exceeding two young whales, after a gestation of nine or ten months, which are suckled in the manner of other mammillary animals.

The whale is a very useful fish: its flesh, however, is rank and unfit to be eaten; but the small laminae, known under the name of *whale-bone*, which are taken from the upper jaw, furnish a lucrative article in commerce. The tongue consists of a soft, spongy, fat substance; which, when boiled down, often yields five or six barrels of oil; though the most valuable part is the Blubber, or fat, found beneath the skin, to the depth of from

eight to twelve inches, and which is converted into *train-oil*.

Whales are chiefly caught in the vicinity of Greenland; though a fishery has lately been successfully commenced in the South Sea. As their fat is of essential utility in domestic life, the maritime powers of the north annually send numerous vessels on this pursuit. Each ship is provided with six boats, which are respectively furnished with harpoons, appended to ropes from 200 to 300 fathoms in length. When a whale is perceived floating on the surface of the ocean, and spouting up torrents of water, the boats approach and a harpoon is discharged. The wounded fish plunges into the deep; and if the rope belonging to one boat be *run-out*, that of another is speedily fastened to it, to prevent the little bark from being carried down with the whale. As soon as the unwieldy creature re-appears, another, and, if necessary, a third harpoon, is discharged, till it rises to the surface, and at length expires. The whale bone is then taken out, the blubber cut to pieces, and stowed in hogsheads.

The proper season for the whale-fishery, is from May to July; and great are the advantages derived from it, not only as an object of commerce, but also as a nursery for seamen.

WHEAT, or *Triticum*, L. a genus of plants, comprehending about 16 species, of which the following are the principal:

I. The *repens*. See DOG'S-GRASS.

II. The *æstivum*, or Spring Wheat, is probably a native of Southern Siberia and Sicily, whence its culture has been gradually dispersed throughout Europe: it ripens about the same time as the Winter, or Common Wheat, even though it be sown in February or March. This species is divided into the following varieties, namely:

1. The *T. æstivum, spica et grana rubente*, or spring-Wheat, with a red spike or ear and grain.

2. The *T. æstivum, rubrum, spica alba*, Red Spring-Wheat, with a white ear.

3. The *T. æstivum, spica et grana alba*, or Spring-Wheat, with a white spike and grain. These, and all other varieties of the same species, are *beardless*, and may be sown from the end of February till early in May. They are not easily affected by mois ure, or severe frost, and afford excellent starch.

III. The *hybernum*, Winter or Common Wheat is principally raised in Britain: its grains are somewhat fuller than those of the preceding species; and its chief varieties are:

1. The *T. hybernum, spica et grana rubente*, or Common Wheat, with a red ear and grain.

2. The *T. hybernum rubrum, spica alba*, or Common Wheat, with a white ear.

3. The *T. hybernum rubrum, spica et grana alba*, or Winter Wheat, with white ears and grains. ...These varieties are also destitute of beards, and should not be sown earlier than in September, nor later than in November....They produce the most valuable wheat, which yields the largest proportion of flour.

IV. The *turgidum*, Thick-spiked, or Cone Wheat, each plant bearing from four to eight ears, and each of the latter from 30 to 70 grains; it differs from the preceding spe-

cies, both in its bearded ears, and its small plump grains, which are more convex on the back than those of the Spring or Winter Wheat... The principal varieties are:

1. The *T. turgidum conicum album*, or White Cone Wheat.

2. The *T. turgidum cònicum rubrum*, or Red Cone Wheat.

3. The *T. turgidum aristiferum*, Large-bearded Cone-wheat, Clog-wheat, Square-wheat, or Rivets.

4. The *T. turgidum*, *spica multiplici*, or many-eared Cone-wheat. .....These varieties are well-calculated for strong, damp, soils; but the corn is apt to *lodge*, if it be sown too closely. Its grain is said to be productive of more flour than any other sort of wheat, though it is much browner, and of an inferior quality.

V. The *Polonicum*, or Polish Wheat, resembles the preceding species; but its stalks attain the height of 5 or 6 feet; the leaves are white-striped from 12 to 24 inches, and the ears six inches, in length. This noble grain is not cultivated to any extent in Britain, though remarkably fruitful, and yielding abundance of flour. It ought to be sown sparingly; as it is apt to lodge, in consequence of which the quality of the corn is impaired.

VI. The *Spelta*, Spelt, or German Wheat, is principally raised in that country, and nearly resembles barley; though its stalks are shorter. In Thuringia, it is generally sown about Michaelmas, in stony, mountainous lands, which are otherwise fit only for oats. In France, Swabia, Franconia, and on the banks of the Rhine, it is more extensively cultivated, even in better soils....:It is well known in commerce, that the incomparable Nuremberg and Frankfort starch and flour are solely obtained from Spelt-wheat. Hence, we are induced to recommend its culture in the northern parts of this island, which abound in rocky pasture grounds, especially in Scotland, where they are often rented at 1s. 6d. per acre. We must, however, remark, that this excellent grain cannot be divested of its husks by thrashing, and that it requires the operation of a mill for that purpose; but it ought to be sown or drilled together with the husks.

VII. The Siberian Spring Wheat, has but lately been introduced into Britian: it attains to maturity as early as the Common Spring Wheat, and increases in the proportion of 25 to one.

VIII. The Switzerland Spring Wheat, ripens a fortnight earlier than the common sort of that season.

IX. The Egyptian Wheat is remarkable for its uncommon fruitfulness: its straw is strong and tough, whence it has received the name of *reed-wheat*. The grains, however, do not yield so large a proportion of flour or meal as any of the preceding species or varieties; and the flower is scarcely superior to that obtained from the finest barley.

X. The Zealand Wheat is chiefly raised in the county of Kent: the straw is long and tough, resembling reeds; the ears are large; the grains white, and *full-bodied*....... This species is well calculated for poor soils; for if it be sown on rich lands, it is apt "to run up to straw."

Lastly, there is a species of Spring Wheat, cultivated in the island of Jersey, and which is termed *Froment Tremais;* being

only three months in the ground: its ears and grains are small, but yield a nutritious flour....Like the Cone-wheat, the last seven species are furnished with long beards.

The White, or Spring and Summer Wheats, flourish best on light soils, while the other kinds and varieties are more advantageously raised on strong lands. The ground, however, ought previously to be well tilled and pulverized: thus, if a crop of wheat be taken after clover has been ploughed in, it will prove uncommonly fine and abundant.

This beneficial corn is propagated, by sowing it either broad-cast, or by DRILLING it with Mr. COOKE's, or similar drill-machine; or by Mr. JERVAS WRIGHT's implement for sowing wheat and other grain; which may be affixed to a plough, or manufactured of any requisite size......Mr. W. obtained a patent for this invention, in 1784; and, farmers may avail themselves of his contrivance, described in the 15th volume of the "*Repertory of Arts*," where it is farther illustrated by an engraving.

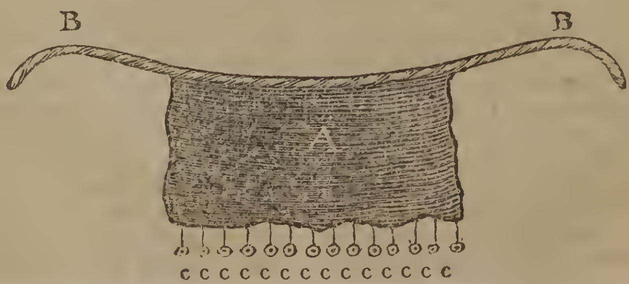
Wheat may also be *dibbled;* but, though a considerable saving is thus obtained in the quantity of seed, yet such method is by no means preferable to drilling. Within a few years, indeed, it has been proposed to increase the plant by dividing the root; and various experiments have been successfully made, with a view of saving seed-corn: the most remarkable is that of Mr. CHARLES MILLER, of Cambridge. He sowed some wheat on the 2d of June, 1766; on the 8th day of August in the same year, a single plant was taken up, divided into 18 parts, and each part separately transplanted. Between the middle of September and October, these plants were again removed, their roots divided into 67 portions; which were likewise set at a proper distance from each other, for enduring the winter. Next, they were dug up a third time, and divided in a similar manner, between the middle of March and the 12th of April; in consequence of which, they produced *five hundred* plants. Thus, *a single grain* yielded in one season:

Ears	21,109
In number	570,000 fold!
In measure	$3\frac{3}{4}$ pecks.
In weight	47 pounds.

For a more particular account of this experiment, the reader will consult the 58th vol. of the "*Philosophical Transactions of the Royal Society*".....The superiority of the Transplanting System over the Drill-Husbandry, is also fully demonstrated in the 3d vol. of the "*Letters and Papers of the Bath and West of England Society.*"

Wheat is subject to the MILDEW, and various other disorders, of which we have already treated, under the heads of BARLEY, CORN, &c. Hence we shall, by way of supplement, communicate two other remedies, which are recommended as being singularly efficacious in preventing the SMUT...... M. HOCHHEIMER, whose authority is often questionable, relates in his German collection of economical and other facts, that wheat moistened with strong *vinegar*, in the proportion of 24 lbs. of the grain to one pint of this liquor, will be perfectly secure from that distemper. The corn should thus be prepared, shortly before it is sown; and, though it be kept for a fortnight in such acidified state, on account of rainy weather, yet it

will not receive the least injury.... The next remedy is that proposed by Mr. ROBERT SOMERVILLE (" *Communications to the Board of Agriculture*," vol.ii.), who attributes this disease to an insect resembling the wood-louse, though infinitely smaller; depositing its eggs in the chaff, or downy part of the wheat: and, as these vermin. if sown with the seed, would either totally destroy the stem of the future plant, or cause it to produce *smut-balls*, he advises the infected or suspected grains to be washed in water; by which expedient, all light or imperfect seed may not only be skimmed off the surface, but the greater part of the eggs of such insects will be separated. As, however, some of these eggs, notwithstanding this precaution, adhere to the grain, Mr. S. recommends the following preparation, that is preferable to infusions of lime, arsenic, and other mineral ingredients, which often retard and destroy vegetation: Take of tobacco-leaves, of pulverized hellebore, and of Barbadoes aloes, each one pound; boil the two first substances, for about an hour and an half, in 10 English gallons of water. The fluid should next be strained through the sieve; then put into a vessel over the fire; and the aloes be added in a state of powder. The whole must now boil, till the last ingredient be completely dissolved: the liquor ought afterwards to be removed from the fire, and poured into a large vessel: when perfectly cold, it should be diluted with such a quantity of pure water as will amount to 30 gallons. The seed ought to be immersed in this preparation, and briskly agitated for 20 minutes; after which it must be dried on canvas, or on the floor....Mr. S. remarks, that if 2 lbs. of coarse glue or gum-arabic be dissolved, its tenacity will cause the bitter ingredients to adhere more firmly to the grain. The expense of this compound is said not to exceed seven or eight shillings, and to be sufficient for twelve bolls (six English quarters) of wheat; and, tho' such liquor be not prejudicial to vegetation, it is so nauseous, that neither pigeons, nor any other of the devouring tribe, will touch it. Mr. SOMERVILLE, therefore, proposes the following method of destroying vermin on the growing crop: A piece of double flannel, about two yards in breadth, and sufficiently long to go across a ridge, ought to be provided with cords at each end, to serve as hands, and also furnished with small pieces of lead at the bottom, as represented in the following figure.



A, the flannel.

B, B, the cord.

c c c c c c c c c c c c c c, are the weights.

This cloth, or blanket, must be dipped in the preparation above described, or in a strong decoction of rue, chamomile, and similar bitter herbs; which is equally disgustful to vermin of every description. One person is then to lay hold of each end of the cord, and to draw the flannel after them in the direction of the ridge, so as to touch the top of every plant: the same operation is repeated a second time over each ridge, in a contrary direction; by which means, both sides will come in contact with the liquid, and the depredations of insects, in general, be effectually prevented. This sweeping, however, ought, if possible, to be performed in dry weather; because those particles of the nauseous ingredients, which may be left upon the ears, will more firmly adhere, than if the latter were in a wet state.

The proper period for reaping wheat, is by no means ascertained; some farmers asserting that it is most advantageous to cut the grain before it is perfectly ripe, while others are of opinion, that it ought to stand till nearly ready to be reaped and housed. The anonymous author of the "*Farmer's Calendar*," observes, that the safest way is that of adopting a middle course, with a particular regard to a *fair* time. If, however, there be any appearance of *blight*, Mr. A. Young thinks, that farmers cannot cut their wheat two early. He remarks, that the green state of the straw is no indication that the grain is immature; because the straw of blighted corn never acquires a bright yellow colour: but remains green till it becomes black. When the stalk is in this condition, the circulation of the sap ceases; and the grain daily decreases in size. He therefore advises the wheat to be cut; laid down on the stubble; exposed to the dew; frequently turned; and, when perfectly dry, the grain may be tied up in sheaves, and carried to the barn. Thus, thousands of bushels may be annually saved, that might afford good *marketable* grain; part of which would otherwise never be thrashed out of the ears, while the remainder would be so light and brittle, as to be dispersed in *winnowing*: the straw will at the same time be tough, and fit for thatching; whereas, without adopting such method, it could not fail of being beaten to pieces in thrashing.....See also the article Granary.

To Prepare Seed Wheat.

[Various steeps have been proposed to expedite the vegetation of the seed, and to protect it from mildew or rust.

The experienced Du Hamel was of opinion that washing the seed well in plain water answered better than any artificial impregnation, and Mr. Wagstaffe of Norwich, (*Bath Soc. Trans.*) is of the same opinion. Mr. Chapelle's experiment, however, mentioned in vol. i. p. 180, is decisive as to the great advantage derived from soaking *barley* seed in the black carbonic water of a stable manure heap, in a dry season. Mr. William Johnston, of Jenkintown, formerly mentioned in vol. ii. p. 284, stated to the Editor, that *he* also steeped his

grain in the black water of a manure heap, in which was dissolved some nitre, and then sifted gypsum over it: the grain thus prepared was sown, and from thirty acres of ground he produced $702\frac{1}{2}$ bushels of wheat.

The following experiment is taken from the "*Balance*," a paper published at Hudson, (New York) and is worth repeating.

"A man in this state, in preparing his seed wheat for sowing, steeped one bushel, twelve hours in pickle, and then rolled it in plaister, and sowed it through the middle of a field containing eleven or twelve acres; on each side of this throughout the field he sowed wheat that had been rolled in plaister, but not pickled. Soon after the grain began to vegetate, he perceived a striking difference, and that, during the whole growth, the stems of the pickled seed were much superior in thriftiness and luxuriance.

"After reaping, thrashing, and measuring the grain, and making a comparison between the products of the pickled and unpickled seed, the owner has affirmed it, as his opinion, that, if he had pickled the whole of the seed, which was sown in that field, his crop would have been increased thereby not less than seventy or eighty bushels."

Mr. Cartier, of Quebec also, advises to wash seed wheat thrice thoroughly in water, then to steep it eighteen hours in strong brine, and to sift lime over it, stirring it well with a shovel, until the wheat be equally dusted, in the proportion of half a gallon to every bushel of wheat. Some exceedingly smutty wheat, was prepared in the above way, and immediately sown, and produced a good and clean grain. *Carey's Museum*, vol. vii. p. 273.

Modes of Sowing Wheat.

The following modes of sowing wheat are practised in various countries.

1. Broad cast.
2. Drilling in continued rows like garden peas.
3. Drilling clusters; in rows.
4. Dibbling: dropping seed in holes.

However easy the broad cast mode of culture may be to the farmer, he is deprived of the benefit arising from hoeing, which the other modes readily admit of.

When the second mode is practised, the plants are horse-hoed between the rows. It is generally agreed that this mode yields more than the broad cast.

Walter Rutherford Esq. of N. Jersey, speaks highly of a mode of drilling which is pursued in N. Jersey. The drill was invented by a farmer, in Somerset county, in that state, and consists of a seed-box over a cylinder that turns with the wheels, and having four holes in the box, answering to notches sloped in the cylinder, thus permitting the seed to fall into drills at 13 inches a part. The drill is drawn by a pair of horses, with a tongue to turn it: when turning, the wheel is to be held fast, and brought round, to run in the outside drill: the head lands are afterwards to be drilled. Eight acres a day may be put in, provided the ground be previously well harrowed.

The advantages of this method as stated by Mr. Rutherford and according to the experience of many farmers, are 1. It takes

somewhat less seed. 2. The seed is much better covered. 3. The ridges on each side mouldering gradually on the green grain, it does not freeze out, during the winter. 4. It is sheltered from the bleak spring winds. 5. It draws off the wet. 6. A crop thus put in, stands the drought well, the roots being well covered.

Mr. RUTHERFORD observes further, " Where the land is richly manured, perhaps this method may not be necessary, and if the fallow be covered with large stones or stumps of trees, it will be impracticable; but on land considerably exhausted, our farmers have experienced it to be advantageous; I reckon it yields double the old method (broad cast.) When I first practised drilling, it was on a field that, the year before, was in summer grain: one part of it gave a much better crop than the rest; and I found that without directions, the teams-man sowed this part by hand." See *Transactions of the New York Agricultural Society*, volume 1st.

Drilling in clusters, permits horse-hoeing and hand-hoeing: and yields still more than wheat drilled in a continued line.

Mr. BORDLEY is of opinion that *dibbling* yields the most productive crop: but that eight or ten grains should be dropped in each hole. This method is tedious and expensive, where labour is scarce.

Mr. BORDLEY invented a simple strong machine which dropped five or six grains of wheat in each cluster on about eight acres. The clusters were seven inches apart in the rows; and the rows were about nine inches from one another. A horse on each side of a bed walked in the water furrows, and sowed an intire bed in eight rows at a time. A light pole extended between the horses, from the neck of one to that of the other. It appeared that, as far as nine grains in a cluster, and from Mr. SINGLETON's experiments, in Talbot county, as far as 15 grains in every cluster, the produce in wheat was progressively the better. Mr. B. recommends to drop the seeds so as to touch one another if possible, as they thus proved greatly superior to the same number of grains spread within circles of three inches, the centres whereof were seven inches from the centres of other similar clusters; when the dibbled were only six inches apart.

Mr. B. estimated his crop at 15 per cent. better than drilled wheat in continued rows, both being hoed alike: which would be $\frac{1}{3}$ or 33 per cent better than broad cast wheat not hoed.

Mr. B. further observes; " after a number of instructive experiments on eleven acres of wheat harrowed in, and compared with wheat at the same time ploughed in; of wheat sown on a *broad level*; on round ridges of various heights; and on flat beds having deep parting furrows, the ridges and beds with their water furrows being seven feet wide, some running North and South, and others East and West, I clearly preferred *beds* to ridges; because it is immaterial in what direction they lie, the sun shining equally on the whole horizontal surface; and because the soil being alike in quality on the whole bed, the wheat grew equally well from edge to edge. The wheat, in reaping, also, was better saved, no short wheat being observed as on the edges of ridges, and the furrows being opened deep,

the rains presently glided into the furrows, and were by them conveyed into the main drains of this flat land, without ever drowning the wheat, or hardening the ground upon the flat beds." Page 89, 90, 2d Edit. of *Notes on Husbandry*.

Preparative crop for Wheat....The most experienced farmers in Pennsylvania, are now in the constant practice of preparing wheat by ploughing down clover after having stood two years. But they have not sufficiently attended to the proper distance of time that ought to intervene between the ploughing down, and the sowing wheat. The great point to be attended to, is to sow the wheat at the period when it is expected that the clover is rotting, and when of course the seed will derive the benefit from the extrication of those elastic fluids(which are the great supports of vegetation,) and of the heat of the fermenting plant. Hence, Mr. MACRO says, (YOUNG'S *Annals*, vol. i.) "that 20 years experience has convinced him, the best way of sowing clover lands with wheat, is to plough the lands 10 or 15 days before you sow it, that the land may have some time to get dry, and after rain enough to make it dress well." Hence too the propriety of Mr. MACRO's practice of ploughing in the clover on a fall of rain, and of waiting for a due state of the ground. Mr. BORDLEY adds, that if rain falls after burying the clover, and before sowing the wheat, it may be necessary to wait for the ground becoming *only moist*, rather than sow when it is wet and heavy. If the farmer ploughs in clover, when the ground is dry, he may choose to wait for rain before he sows. Though for this reason alone he need not wait. I have found it generally safe to sow during a drought, when the soil is very dry; but *not when a light* rain *has fallen* on *very dry ground*. In the former case, the seed is safe till a rain falls, which is usually in plenty after a drought; and the seed then quickly grows up: in the other case, it is slightly dampted, and it swells, but the moisture is so soon evaporated as to leave the seed to dry-rot and perish." An experienced person made the same observations to the Editor, with respect to sowing seeds in a garden.

Mr. STEELE, of Montgomery county, (whose admirable plan for extirpating wild garlic, was mentioned in vol. iii. p. 148) communicated the following experiment:

He ploughed down part of a ten acre lot, one half of which he harrowed and sowed with wheat, the other half was permitted to remain about 14 or 20 days, and was then ploughed a *second* time, harrowed and sown with wheat. The clover at the second ploughing was found completely rotten, and the wheat sown upon this twice ploughed piece, yielded nearly double the crop of the other which had been ploughed but once.

In the above experiment it is probable, that the piece first ploughed had been sown before the decomposition of the clover took place; the part twice ploughed, by some management, may not have had the rotten clover turned out as is commonly done when a clover lay is ploughed twice; but there can be no question as to the superiority of the crop, if after being once ploughed, it had been merely harrowed and sown, at the period, and instead of the second ploughing; for by this ope-

ration, much carbonic acid (fixed air,) must have been evolved, which would have been retained.

Gypsum, a manure to wheat..... In the Friends Settlement in Loudon county, Virginia, south of the Blue Ridge, a great quantity of fine wheat is raised. The soil is of a deep chocolate colour. Mr. Wm. West, of Delaware county, Pennsylvania, was told last spring, that the crop of 1802, averaged 30 bushels to the acre. Gypsum was scattered on the wheat in the spring, in the proportion of one bushel to the acre, and was said to be attended with the most remarkably good effect of trebling the produce of the land. Gypsum is found useless in Pennsylvania for winter grain. See article Gypsum.

This surprisingly good effect of gypsum upon wheat, which is so contrary to the experience of our farmers in Pennsylvania, ought to be carefully attended to. The intelligent farmers of Loudon county, should inform us of the nature of their soil, and their medical men should analyze it. If gypsum could be generally made to increase the product of wheat, as it has of clover, a Second Mine would be opened to the people of the United States.

The means of getting out wheat from the straw are three.

1. By the flail.
2. By treading with horses.
3. By threshing mills.

The method by means of the flail is well known. The second, is but partially used in the United States, though there can not be a doubt of its superiority to the mode by the flail. It is a common practice in Maryland and Virginia.

Mr. Bordley observes "some farmers shift their treading floors from field to field; whence much rough dirty wheat goes to market. Those who have a proper earth, on a perpetual floor used for treading crops of wheat, year after year, will have it glossy, and the wheat from it will have no more dirt than if threshed on plank with flails; provided they are attentive in taking off the horse-dung directly as it is dropped, and not let the horses stop, to stale, until each journey ends and they are led off; and, provided, that as soon as the treading season is over, they cover the floor thick with straw, to remain till a week or two before they are to tread in the next season. Cattle may be foddered on it all winter, keeping it full of litter, to prevent horses from sinking and poaching the ground. When horses in halters are led in ranks, and each rank kept as far apart from the others as possible, time is given for taking off the dung dropt before the next rank tramples on it; and in this detached way of travelling, the horses are kept cool. Mr. Bordley states the advantages to be: 1. An entire crop of wheat beat out before the end of July, which preserves it against the *moth-fly*.

2. Little opportunity is left for pilferers, and the wheat is ready for an early market.

Treading floors are from 60 to 100 feet diameter, some are only 40 feet; others again 130, and more. The larger the diameter the easier to the horses. I never knew a horse disordered on a large floor, (above 60 feet). The track or path, on which the sheaves are laid and the horses tread, is from 12 to 24 feet wide.

Mr. Bordley submits the fol-

lowing method as the best within his knowledge. The floor is unincumbered with any fence. A barn 60 feet square is in the middle of it, around which the horses travel, on the bed of sheaves about 25 feet broad; so that the diameter of the whole treading floor is 135 feet.

If the weather be likely to continue fair, the morning is suffered to pass away until the dew is off the stacks and floor. A row of sheaves is first laid flat on the floor, with the heads and butts in a line, across the stack of it, as a bolster for receiving the other sheaves with their heads raised on them; and these sheaves range with the path and circle, the butts resting on the floor. Other sheaves are in like manner ranged, with the heads raised on the former sheaves, till the whole floor is filled, appearing with nothing but heads of wheat, sloping upwards. The bands are to be cut, layer by layer. A westerly wind is to be wished when treading; and it is preferred to place the stacks eastward of the floor, to give a free passage to the west winds.

In my treading, 24 horses are formed at some distance from the floor into four ranks; when the floor is ready, a boy mounted, advances in a walk with the rank haltered together, and enters on the bed of wheat; another rank follows, as soon as the first has obtained a distance equal to a fourth part of the circumference of the bed, and so of the other ranks. They are forbid to go out of a walk, till having walked upon the bed five or six rounds; word is given to move on in a sober, slow trot, and to keep the ranks at their full distance from one another. The trot is continued till the horses have travelled 8 or 9 miles; they are then led off to be fed, watered and rested, while the trodden light straw is taken off, as deep as to where the sheaves lie somewhat close, and but partially bruised.

One third of the width of the bed, is turned over on the other two thirds from the inner side or circle of the bed. The horses are again led on, and trot out their second journey, till the straw be again light and clear of wheat. It is then taken off, as deep as to what lies more close. The horses are again rested, &c. while the outer third of the bed is turned upon the middle part of the bed. A third journey is sufficient. The straw being taken off, the whole remaining bed is turned up from the floor, and shook out with forks and handles of rakes. The horses tread this well; their journies are then finished.

A neighbour viewing the treading of wheat on my floor, said the method is admirably easy to the horses, and that most of the time is spent in taking off and carrying away the straw; but he thought it would be a saving, if the outer half of the bed be trodden till enough, and then the horses shifted on the inner half of the bed; and whilst this is treading, the straw might be carried off from the outer half, first trodden.

3. Many threshing mills have been invented in England and Scotland: but they have all been highly expensive, and so complicated that they were easily deranged; and hence, even at this day, opposite opinions are entertained as to their utility. In the "Sherborne Mercury," for January 12, 1801, mention is made

of a threshing machine, erected for J. HANNING, Esq. of Dorset, which threshes and cleans 400 bushels of grain and sacks it in 12 hours, with the assistance of five men." What a treasure would such an implement prove to an American farmer!

On this subject Dr. JAMES ANDERSON observes, to the Editor, "that no threshing machines requiring a greater power than that of one good horse, can ever give satisfaction to an intelligent farmer; because, when it works faster, the man who feeds it, is too much hurried to be able to do it well; in consequence of which the grain is laid in unequal lumps that derange the operations, and greatly augments the force required: for these obstructions must, to be overcome, break the machine, and never perform the work well." This is an important general rule, well worth attending to.

The threshing mill of Mr. HOXIE, of Hudson, New York, was mentioned in p. 114, of the present volume, to which we refer.

The following observations upon harvesting wheat, and on the mildew deserve attention.

"What stage of ripeness is the best for cutting wheat, is not ascertained in America; but I have seen enough of cutting early to be convinced that it commonly is suffered to stand too long.

"At the time of reaping, we generally have a clear sky and a peculiar drying air, which in some harvests ripen wheat very suddenly, so that the plants from an apparent state of vigour, are killed in a day or two, and receive no further nourishment from the root or blade; and even the stems become exhausted of the nourishment which they had imbibed, so that it could not reach the ear or grain. If with this sudden heat and drying state of the air, the plants be struck with *rust*, and are still suffered to stand longer, the grain, receiving no more nourishment, can never fill; but by cutting it instantly, and setting it sheltered to cure gradually, the best chance is had for obtaining marketable good wheat.

"The reaping corn 10 or 14 days earlier than my neighbours, (says Mr. PARKINSON) is an advantage I have attended to. As corn begins to decay *first at the root*, all the nourishment it can receive, while standing uncut, after the decay of the root, must be derived from the straw. The dews may feed the grain at one time; but *when nearly ripe* and the *root decayed*, the sun and wind have so much power as to ripen it too quickly, or scorch or dry it before its natural period of maturity.

"Riding on the road about harvest time, he observed a field of wheat that had taken the *mildew*. The straw was of a remarkably deep green, and instead of being dead, appeared to have acquired a greater verdure; though after such appearance comes on, it never receives any nourishment or grows larger. Instead whereof the *straw* becomes distempered, spotted, and discoloured. The sooner it is then cut the better. He took 12 ears of the wheat, which, as well as the straw, were green as grass, and at the same time *mildewed*. A great deal of rain had fallen the forepart of the day; but the ears of wheat were pretty dry. He tied them in a bunch,

intending to hang them up in his house to dry and ripen. Several weeks afterwards, having been forgot, he took them out of his great coat pocket; when the straw was found to be still green. The *grain* was then rubbed out, and to his astonishment he never saw better. It was fine in colour, and well filled; but what remained in the field, from which he took these ears, was very small and of little value. This is a strong case, which ought to make an impression on the minds of our farmers. He adds....From hence it would seem, that if the farmers would cut their wheat when it is struck with mildew, and set it up in the field in small stacks of about a cart load each, so as neither to *heat* nor *mold*, it would be better than to let it stand, as is the practice, uncut.

"He had, at the same time, taken twelve ears of wheat from an adjoining riper field, which were likewise found in the other pocket of the great coat. Though these, when gathered, appeared so much superior to what had taken the mildew, they did not turn out nearly so good as the others. From the above circumstances, Mr. PARKINSON was ever after partial to cutting wheat when the straw appeared of a reddish cast, or some of it green with the joints full of sap; and it fulfilled his expectations. The straw, he adds, is better for chaff; the flour much fairer and heavier; and for fine flour it will grind into broad bran. But he does not think that if the wheat escapes the mildew, it ought to be cut so green.

"The farmer may take into consideration at what time it will be best that he cut down his wheat; for a slight degree of rust it need not be hurried; but when greatly rusted in its advanced state of ripening, and when considerably scabbed (which never happens but in the moment before it ripens) immediately cut down, and guard it against sun and wind, slightly, lest by securing it too close, it heat and be entirely spoiled..... What in wheat is by some called scab, by others is called empty ears."

Captain ROMANS, in his account of Florida says, that a Mr. YOUNG of Georgia, mixed rye among his seed wheat, and thus escaped the blast. It was repeatedly tried till he was convinced of its efficacy; and then he sowed five acres with wheat, surrounded by a list of 25 feet breadth of rye, and this also succeeded. Mr. BORDLEY heard an English farmer say, that rye sown mixed with wheat, will prevent the wheat from being blighted, in England.

Beside the mildew, the wheat has to encounter two great enemies, in the fly and moth. The one attacking it in the ground, and the other after it is cut.

The first insect has been already noticed in vol. 3d, p. 54. where the valuable observations of JOSEPH COOPER, Esq. may be found. This insect is now known to be a *Tipula*, belonging to the Diptera order of LINNÆUS, and to the eleventh order or *Antiliata* of FABRICIUS.

The other insect is a species of moth. It is believed to be described by DU HAMEL; its history is accurately detailed by L. CARTER, Esq. of Virginia in the 1st vol. of the *Trans. of the American Philo. Society*. Mr. CARTER is of opinion, that the egg is lodged

in the grain before it hardens ; and the same opinion was expressed to the Editor, by an intelligent farmer, in the neighbourhood of Philadelphia. When the grain is threshed and laid in heaps it heats and hatches the insect, but if kept cool and free from the air, it will escape. It is found best to thresh speedily after cutting the grain, and before it is sweated.

Mr. Robert Ferryman of England, has invented a machine to take off the outer coat of wheat, previously to being ground, by which the whole of the grain may be used in bread, without any of the inconveniences hitherto found in bread, made from the whole of the meal.

It appeared in the examination of Mr. F. by a committee of the House of Commons ; that blanched wheat grinds in two thirds of the time required by common wheat, and that twenty bushels per hour can be turned out.

Wheat blanched in this way, may be kept for any length of time, without any risk, and might be laid 20 feet thick in the warehouse withou tinjury.

To what American shall the U. S. be indebted, for the introduction of this useful machine into his country ! !

Connected with the subject of wheat, may be mentioned the *press for packing flour* invented by Mr. Evan Evans of the Federal city, and which is in actual operation at Mr. Oliver Evans' store in Philadelphia. The following cut and explanation will give an accurate idea of this very useful contrivance, by which a barrel of flour may be packed in a minute.

Explanation.....A, the barrel of flour: B, the funnel, resting upon the edge of the barrel by a shoulder: C, D, the driver: E, F, the lever: G, H, the connecting bars, fastened by a strong pin to each side of the lever at G, and to the driver at H: I, I, two strong posts put through the floor, and keyed below the joists at K: the lever works between them on a strong pin L: the lever brought down by the hand, moves the pin G, in the dotted circle I, and the connecting bars draws down the driver C, forcing the flour into the barrel; and, as it becomes harder packed the power of the machine increases, as the pin G, approaches the posts I; this with its dispatch, is what constitutes its excellence; for a weight being hung to the end of the lever, continues to pack more powerfully as the lever descends; by which goods may be packed very hard in a short time. To increase the power, the under sliding part of the lever is drawn out to increase its length; the lever is raised again by the weight M, fastened to a line passing over the pullies N, O.]

WHEAT, the Cow. See Cow-WHEAT.

WHEEL, is a simple machine, consisting of a nave, fellies, and circular brim, or pieces of wood generally surrounded with iron; and thus revolving on its axis.

In the year 1798, the *Society for the Encouragement of Arts*, &c. rewarded Mr. JOSEPH DIXON with the sum of 15 guineas, for his contrivance of a *Preservative Wheel*, that may be affixed to a walking wheel-crane; by means of which all accidents to labourers will be obviated, in case the weight should at any time overcome the power. His implement is attached to the axis of the crane-wheel; over the latter are passed two ropes, of which the men may take hold, so as to suspend themselves with the greatest safety, during the time of danger. Pullies are likewise placed near such preservative wheels, over which the ropes turn, and are thus prevented from taking fire, in consequence of the friction. For a more explicit account of this useful invention, we refer to the 11th vol. of the Society's "*Transactions*;" where his statement is elucidated by an engraving.

A patent was granted in August, 1799, to Messrs. GEORGE DODSON, and JOHN SKIDMORE; for a method of making the naves or stocks of wheels, of cast-iron, brass, or compound-metal. A description of their process is inserted in the 12th vol. of the "*Repertory of Arts*," &c. together with an appropriate plate.

WHEEL-DRAG. See DRAG.

WHEEL-CARRIAGES. See CARRIAGE, CART, WAGGON, &c.

[" In the second volume of the *Communications to the Board of Agriculture*, is an excellent paper 'On the effects which carriage-wheels, with rims of different shapes, have on the roads.' By ALEXANDER CUMMING, Esq. F. R. S. Edin.

" Mr. C. begins with shewing, that the properties of all wheels, so far as regards this inquiry, depend upon their affinity to the cylinder or the cone: and in order to shew the nature and tendency of each class, he proceeds to state such properties as unavoidably arise from the shape of these bodies.

"In the first place, the cylinder having all its parts of equal diameter, will, in rolling on its rim, have an equal velocity at every part of its circumference, and necessarily advance in a straight line: and as all the parts of the rim have an equal velocity, none can have a tendency to drag forward, or retard the progress of the others: they all advance with one consent, without the rubbing of any part on the surface on which they roll. As there is no rubbing, there can be no friction; and consequently a cylinder perfectly round, hard, and smooth, would roll on a surface perfectly level, hard and smooth, with the least possible resistance, however great its weight, or the pressure on its rim. It therefore follows, that all the power that is employed in drawing forward a cylindrical body, in a straight line, on a compressible substance, is ultimately applied in compressing, smoothing, and levelling the substance on which it rolls. The rolling of a cylindrical body, therefore, can have no tendency to alter the relative situation or position of the parts of materials on which they pass, nor any how to derange them, but by a progressive dead pressure, to consolidate, level, and smooth them. These properties of the cylinder are practically confirmed by the effect which frequent rolling with a cylinder has on gravel walks; it renders them compact, hard, smooth, and impervious to rains; and consequently secure against the devastations of hard frosts.... Nor does it break or grind the gravel, more especially after the first time of rolling, when all the parts are laid flat and smooth. If a cylinder be cut into several lengths, each part will possess all the above properties; and if the rim of a carriage-wheel be made exactly of the same shape, it must necessarily have the same tendencies; and its rolling will have the same effect on roads, provided it be not narrow, that cylindrical rollers are observed to have on garden walks*.

"All these properties of the cylinder depending wholly upon the equality of every part of its diameter, and consequently upon the velocity of every part of its circumference, are peculiar to it; and it is impossible to gain equal advantages with any other shape of the circumference of a wheel.

But as conical rims have been universally preferred for a series of years, it is natural to suppose that there were obvious reasons for such preference. On this account, Mr. C. proceeds to investigate the properties that must necessarily arise from the shape of the cone; in order to see how far this preference can be justified.

The cone diminishing gradually from its base to its point, the velocity of every part of its circumference in rolling on an even plane, will be dimished *as the diameter;* and at the very point, where there is no visible diameter, there will be no perceptible motion, the cone revolving round *it*, as a fixed point, or centre. If the cone revolve about this centre, the space described by each part of the cone in rolling round its point, being as the velocity with which that part moves, the cone will roll *in this direction*

* The advantage of increasing the breadth of *cylindrical* rims is too obvious to be insisted on: as the surface which sustains the pressure of the load is increased, the pressure on each part of it is diminished; and consequently the power of crushing the materials on which they roll.

without rubbing, and with the same facility that the cylinder does in a straight line. But if the cone be made to advance in a straight line, the natural velocities of its several parts will *not* be as the spaces over which they are compelled to advance; therefore a rubbing or friction will take place at its circumference, from the different velocities of its parts, which must render the draught heavier. And if the cone be supposed cut, and separated into several parts, and each to form the rim of a broad wheel; each part, if rolled in this separated state on a level plain, would roll in the same circle round the conical centre, that it did when all the parts were connected. And the difference of velocity of the parts of each wheel, and consequently the friction and resistance at its rim, when advancing in a straight line, may easily be determined. It will also clearly appear, that the rubbing at the rim of each, will, in passing over a given space, be increased as its diameter is diminished, and its breadth augmented: so that a wheel of this shape must have the smallest part of the rim absolutely dragged along the surface of the road a certain portion of all the way it goes, which will be a great weight to the draught.

But the evil arising from this friction at the rim of conical wheels is not confined to the increased labour of the cattle only; the *greatest efficacy is also given to their increased exertions* in destroying the hardest and most valuable materials of the roads: the largest part of the wheel dragging forward the smallest, and it with equal force resisting, there arises an action and counter-action, and the largest and smallest parts of the rim advancing with different velocities, and pressed by the weight of a heavy load, become alternate fulcrums to each other, for the destroying and grinding of the hardest materials that can be procured. Whoever takes the trouble of enquiring into the requisites of a well constructed pulverizing mill, will find them combined in the conical broad wheel of a heavy-loaded waggon. The materials being thus ground to powder, this is raised in a cloud of dust, to the great annoyance of the traveller, to remedy which, watering is used near the metropolis, which keeping the roads moist, anticipates and increases the effects of wet seasons.

When the roads are moist, pliant, and compressible, the effect of the *conical rim* is altered, but not less destructive: on the approach of wet seasons, the body of pulverized matter that lies upon the more solid gravel which supports the wheels, is soon mixed with water, and forms a body of sludge, which excludes air, and keeps the roads in a constant state of moisture; this soon renders the interior parts of the roads so moist and pliant, that the pressure of a heavy waggon-wheel will make the whole breadth of its *conical rim* to apply flatly, and press hard upon the more solid materials that lie under the sludge: the parts of which being now in a state more susceptible of altering their relative positions, comply with the motion of such parts of the wheel as immediately press upon them: thus all former concretion is destroyed, induration prevented, and the materials which form the crust of the road are left in a broken unconnected state, ready to imbibe the water which the sludge on its surface

supplies constantly and abundantly. How different is this from the consolidating effects of cylindrical rims under the same circumstances.

In rolling on paved streets, nothing can be conceived more calculated for their destruction than the *conical rim* of a broad wheel. Let us suppose the *largest* part of the circumference to bear upon one stone of the pavement, and the smallest part of it upon the adjoining stone; the one will be pushed backwards, and the other dragged forwards by the force of the horses that draw the carriage; if this force be sufficient to open the joints between them, so as to admit water, the mischief is done: a wet joint imbibes more water; this softens the gravel with which the paving is laid, and leaves it less able to resist the next effort, by which the joint gets more loose, and admits water sufficient to float and discharge the gravel, Cylindrical wheels will not only prevent all this mischief, but also improve the streets by producing the effect of the rammer wherever the wheel passes. Conical wheels likewise increase the friction on the axis by their constant tendency from a rectilinear direction: this likewise occasions a rubbing against the sides of deep ruts, which throws up the dirt towards the middle of the road, greatly obstructs the progress of the carriage, and increases the labour of the horses.

Such are the effects that unavoidably arise from the conical shape of wheels, and they seem as much calculated for the destruction of roads, as those of cylindrical wheels are for their preservation and improvement: and seeing that the cylindrical rim is the most favourable that can possibly be adopted for the preservation and improvement of roads, and that the conical is the most destructive, a certain advantage must be gained by using the former instead of the latter; and as this advantage must be in proportion to the space and surface that is rolled, it cannot be thought excessive, Mr. C. thinks, to rate that difference at one shilling for every acre of road that is rolled with an improving roller instead of an impairing one.

Mr. C. then goes on to inquire what may be the probable amount of the advantage that may thus be gained to the nation yearly by adopting cylindrical rims for the wheels of such waggons only as travel the turnpike roads. The number of waggons in England is upwards of 96,600: and supposing that only a tenth of that number is employed on the turnpike roads, and a fourth of that tenth, or a fortieth of the whole, to have wheels twelve inches broad: and of the remaining three-fourths, that one-half have wheels six inches broad, and the other half wheels only four inches, the statement will be as follows:

Number of waggons employed on the roads		9,660
Waggons with twelve-inch wheels	2,415	
D° with six-inch wheels	3,622½	
D° with four-inch wheels	3,622½	
		9,660

A wheel 12 inches broad, will, in rolling 30 miles, cover a space of 158,400 feet, and the four wheels of a waggon rolling a double surface, will, at the same rate, in a day's journey, roll a surface of 633,600 feet, which is equal to the whole surface of four miles of a road 30 feet wide; and something more than $14\frac{1}{2}$ acres. So that

2,415 waggons, with 12-inch wheels will, in a day's journey of 30 miles, roll,	35,012 acres.
3,622 waggons with 6-inch wheels	26,259
3,662 waggons with 4-inch wheels	17,506
The number of acres rolled in a day by all the waggons	78,777

"And supposing all the waggons, at an average, to travel only 90 days in a year, they will roll a surface equal to 7,089,930 acres; which, at one shilling only per acre, will exceed 350,000*l.* per annum.

"Independent of pecuniary estimates, the quantity of surface that is rolled yearly by waggons that travel the roads of England, is equal to the *entire surface* of 1,948,880 miles of road 30 feet wide. It is surely therefore of importance to use such wheels to roll this very extensive surface, which will improve instead of impairing it.

"In the preceding estimate no allowance was made for such waggons as are used in agriculture, and that seldom come upon the public roads; but as every improvement of the private, as well as of the public roads, must be a national benefit, our author proceeds next to consider what advatages may be gained on the private roads by the same means.

"86,940 waggons are supposed to be employed for the purposes of agriculture, which is nine times the number that has been supposed to travel on the turnpike roads: but as they do not keep constantly even upon the private roads, he supposes them to travel the roads only 1 day in a month, at which rate they will, *cæteris paribus*, roll one-ninth more surface than all the waggons that travel the public roads at the rate of eight days in the month.

"But supposing it only equal, as the quantity of surface that would be rolled annually by all the waggons travelling the turnpike roads in England, is equal to the surface of 1,948,880 miles of road 30 feet wide; and in taking an equal quantity for the private roads, the whole surface that is rolled yearly by waggon-wheels, on the public and private roads together, if uniformly diffused, would cover every part of the surface of 3,897,760 miles of a road 30 feet wide; and in proportion as the length of road on which this traffic is supposed to be carried on is shortened, so much the oftener would it be rolled. The circumference of the terraqueous globe is computed at 24,900 miles, and if a road 30 feet broad was made quite round it, the waggons that travel the roads of England would annually roll every part of its surface 150 times.

"Now suppose two such roads made close to each other, and in every respect similar, as to formation, materials, and exposure, but that the one is rolled by cylindrical and the other by conical wheels, 75 times in the year, the former will be rendered more compact, close, and impervious to water,

each time of rolling; and in the end, will be so solid and hard, and its surface so close and smooth, and so free from dust in summer and sludge in winter, as neither to admit nor lodge-water, which is the most effectual means possible of guarding against the destructive influence of wet seasons and severe frosts, and consequently of keeping the roads in continual good repair at the least expense. But the other road being rolled also 75 times, *but with conical wheels*, they will in dry seasons pulverize and destroy the best materials intended for the protection of the roads; and in wet seasons, they alter the arrangement, and destroy the texture of the component parts of the crust, and leave them in a broken unconnected state, ready to imbibe water, which is constantly supplied by the sludge on the surface; which also effectually excludes the sun and air; and thus the roads become rotten, and break into holes and ruts; and if a rainy season be succeeded by severe frosts, they will raze to the foundation every part into which the water and frost have penetrated.

"If any man of observation, who has had an opportunity of attending to the nature and repair of roads, and the expenses attending such repairs, seriously consider all the above circumstances, and make his own estimate of the number of men, quantity of new materials, as well as the extent of labour and expense that would be yearly necessary, but more especially after a wet autumn and a severe winter, to restore the road that had been rolled by conical wheels, to an equal state to the road that was rolled by cylindrical wheels he will probably, make his estimate to exceed any thing that has been here stated. The road rolled by the conical wheels will not only be much more expensive than the other, but is liable, for some months in the year, to be in a very disagreeable and dangerous state, and at no time so pleasant as the road which is rolled with cylindrical wheels, on account of the dust in summer, and the deep sludge in winter. And the draught of carriages is at all times, and especially after repairs, much heavier than on that road which remains always unimpaired.

"When the advantages of cylindrical wheels are fully proved, and universally known, there is no doubt that light, smooth rims, truly cylindrical, and broader than are now used, will be adopted universally for carriages of pleasure and dispatch, as well as for those of burthen; which, considering the immense number of carts, coaches, &c. &c. in this kingdom, will add greatly to the advantages already stated; and the savings that must arise in the repairs of private roads from the use of broad cylindrical wheels, will very soon repay the first expense of making them of a sufficient breadth to admit carriages of any dimensions, which will totally obviate the only reason that now exists for using a bended axis and conical rim, and pave the way for the universal adoption of a straight axle and a cylindrical wheel.

"The narrowness of roads in their early state, made it necessary that the wheel-carriages should also be narrow, and it is more than probable that the carriages first used were only for the purposes of husbandry, and drawn by one horse. But in process of time, it was found

expedient to enlarge the carriages, and to increase the number of horses; but the narrowness of the roads, and the depths of the ruts that were already cut in them, made it necessary that the wheels of the new carriages should run in the tracks of the old. To gain the advantage of a wider carriage without making the wheels run wider it became necessary to alter the original construction; the axletree was now fixed immoveably to the body of the carriage, and the wheels made to turn independently of each other on its ends, which were made to incline, or bend downwards, by which means the wheels stood farther apart at top than at bottom; and thus room was gained for the body of the carriage, without widening the track of the wheels. The axis being for this reason bent, and the wheels no longer standing parallel, it was necessary, in order to gain a flat bearing of the whole rim, to shelve it off towards the outer edge, as much as the ends of the axis were bent from the straight line, and *thus the rim became conical.* The reasons for this structure now no longer exist.

"If the breadth of cylindrical wheels, and the lengths of the axles be made to bear a regular proportion to the number of draught horses; and the fore wheels to run narrower than the hind, so as to roll a double surface; the roads formed flat, and proper regulations made for quartering the roads; every waggon might be made as effectually to improve that part of the road on which it rolls, as if the horses had been employed for that only purpose. It is true, that the rollers in this case are not so broad as might be desirable for that purpose, but if the effect be not so extensive, it is more dense and compressive; and if the roads are made so nearly flat that carriages may with equal conveniency drive upon every part of them, they will be more equally traversed, and more uniformly improved than at present; the destructive effects of the conical wheel will be evaded, and the draught of the horses made much easier.

"The author next proceeds to examine what sum would pay for the labour of the horses that might be thus made to roll the roads gratis, if they were only employed for the purpose of rolling them; and on the supposition that the number of waggons that travel the roads is 9,660, each on an average drawn by three horses, the number of horses will be 28,980: and taking an equal number for those waggons that use the private roads, the whole number will be 57,960; and supposing them to be employed only 90 days in the year, at 4*s.* a day for each horse, it would amount yearly to *upwards of a million sterling*, without reckoning the expenses of the men necessary to attend the rolling.

"Our author then goes on to examine the bad effects which arise from using wheels that have not an equal bearing of their whole breadth, but bear on a narrow part of the middle of the rim. These wheels which were contrived to evade the wise regulations of the legislature with respect to broad wheels, he shews are still more destructive than the flat conical rims, as they plough up the roads. He next proceeds to inquire into the best methods of constructing roads, and objects to the convex or barrelled roads which have been

generally preferred. These roads he observes certainly possess the advantage of carrying off the water towards the sides when they are just finished, and have their surface of that perfect smooth form which the theory always supposes them to have : but as soon as any ruts are formed, they obstruct the running of the water towards the sides, and retain and conduct it longitudinally along the road, contrary to the original intention; and as no proper means have been used in forming the roads, to carry off the water from those ruts, it remains in them, and is mixed deeper and deeper with the materials of the road by every wheel that passes, till at last, the hard protecting crust is worn through, and the wheels penetrate to the soft materials of which the road was originally formed, and deep holes are thus made, which, by the constant passing of all carriages in the same track, are enlarged into dangerous gulphs ; and all those evils arise from the convex form, which obliges all carriages to drive on the very highest part only ; and thus the imaginary advantages of convex roads vanish in practice, and in place of advantages, we meet with evils of the most formidable nature.

" When the crown of the convex road is rendered impassable by the constant traffic of all carriages in the same track, if any be compelled to travel on the declivity on either side, the wheels force the hard materials down the sides ; aided by their own weight and the tremulous concussions of the roads, and thus the best materials of the convex road are insensibly shifted from the middle towards the sides; from the only part of the road constantly frequented, to the extremities, where they can be of no service.

" Flat roads, that are level from side to side, our author observes, are much more pleasant to travel than the convex ; every part of the whole length being equally convenient, is frequented, and equally worn, and there being no such declivities as on the sides of convex roads, the materials have no tendency to shift from the spot on which they are laid ; no deep ruts are formed, because the road is equally traversed, and the traffic of carriages equally and voluntarily diffused over every part of its surface; the track of every wheel, however shallow, becomes a small channel or drain to conduct the water in small quantities along the road, in which direction it was intended to flow, provision being accordingly made to gain a proper current, and to carry the water off the road by shallow channels across it; at proper and convenient distances; and here it is to be observed, that as each carriage takes its own course, there being neither rut nor declivity to prevent it, every carriage making new channels to carry the water from the surface of the flat road lenthways; the more carriages that pass, the sooner will the roads get dry ; and thus the frequency of carriages passing on a flat road, in rainy seasons, has a tendency to keep it dry, and in that respect. to improve it ; whereas on a convex road, the frequent passage of carriages tends to its immediate destruction.

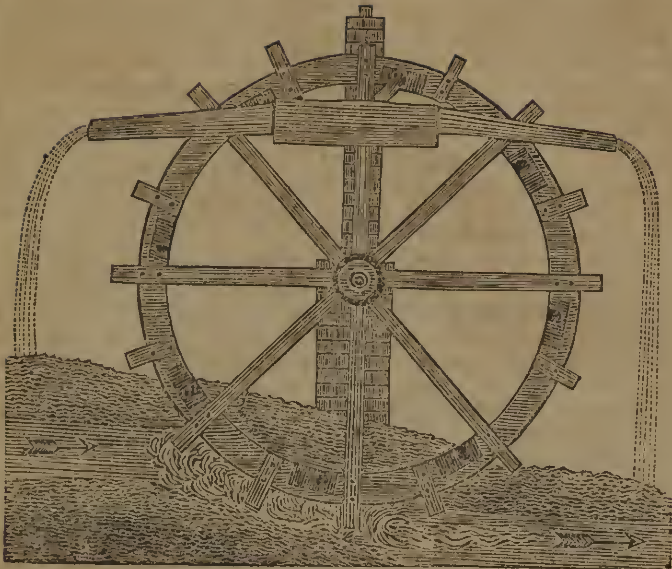
" Mr. CUMMING next proceeds to illustrate his doctrines of the effects of conical and cylindrical wheels on different kinds of roads, by a series of well contrived expe-

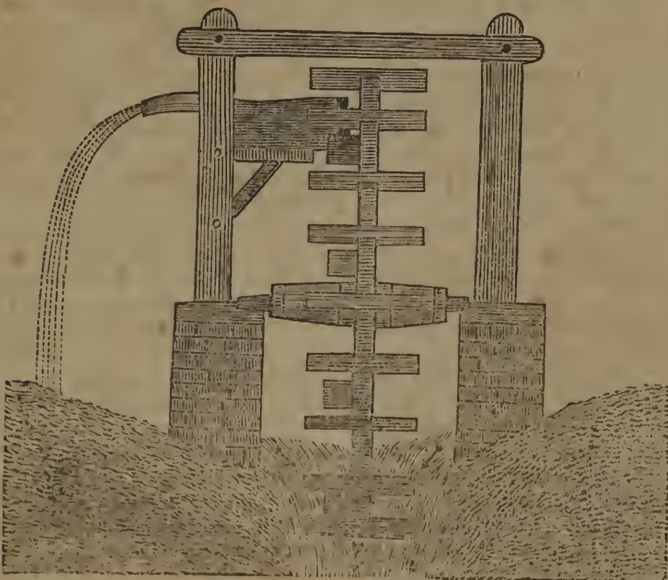
riments with models. The apparatus is particularly described, and the interesting results given at length, which we cannot copy in this work, as it would extend our account to too great a length; we shall only observe, that the conclusions from the result of the experiments, and from the theory stated in the preceding part of the paper, concur in proving, that so far as regards the labour of cattle, or the facility of the progress of carriages, as well as the preservation of roads, the cylindrical shape of a wheel is preferable to any other. We have endeavoured to place before our readers a rude sketch or outline of Mr. Cumming's excellent paper, which contains 63 quarto pages; and should the subject be interesting to any of them, they will find their trouble repaid by turning to the *Communications to the Board of Agriculture*, vol. ii. p. 351."

Wheel (lifting) the American lifting wheel is described by Mr. Wm. Tatham, in his late work, entitled "*National Irrigation*," p. 39. which has been already referred to, and which ought to be consulted by every farmer.

The diameter of the wheel is equal to the perpendicular height of the summit level to which the water is to be raised at a single operation; allowing for so much thereof as should dip into the stream to fill the buckets, and so much as should pass above the uppermost trough to discharge the water from them.

This shape is then reduced to an exact circle by the means of a line and chalk, extended from its centre, and the surplus plank being hewn down to the scribe of the circle, an axis of about two feet six inches in length, is fitted to it with arms of the same plank, and two small iron gudgeons to turn upon. Flutter boards are then fitted on with the saw, and cleated at convenient distances; with a close box between every second and third of them, nailed upon the rim of the wheel. These boxes (by some, termed gaining and loosing buckets) have two apertures or holes for receiving and discharging the water; and as the bucket is immersed in the stream below, by the power of this little rapid acting upon the successive flutter boards, the water is taken in at one hole and discharged out at the other, as the wheel revolves it over the trough above. These are sometimes formed out of a worn-out cart wheel fixed upon an axis, which answers for a small elevation. The nearest description of an invention similar to this wheel, which I have met with in any of the English authors, is that described by Mr. Ferguson, in p. 152 of his Lectures, under the name of the Persian wheel. This wheel of Mr. Ferguson's acts in the same manner by a flutter board, and discharges by strikeing the bucket against a pin at the summit point of its revolution; but the German lifting wheel has greatly the superiority in respect to simplicity and cheapness, which brings it within the reach of every man who occupies land; and, possessing equal power with the Persian wheel, may be considered steadier in the fixture of its flutter boards, and the best medium between this and the ruder contrivance described by Sir George Staunton, as one applied to similar purposes in China.]





WHETSTONE, is a kind of sand-stone, dug up chiefly in Derbyshire, and other northern counties. It is of a dusky-yellow colour; resists the action of acids, though permeable to water: being of a rough, and coarse structure, it is easily crumbled or broken between the fingers, and will not strike fire against steel. This fossil affords an useful article of trade, and is employed for sharpening knives, scythes, bills, and other implements of rural and domestic economy.

WHEY, is the serum or watery part of milk, which remains after the cream and coagulable matter of that fluid are removed, either by churning, or by separating it with RENNET, vinegar, cream of tartar, &c.

Whey is an agreeable and wholesome liquid: the best is that separated by rennet; as a considerable portion of curd and saccharine particles are suspended in it: whereas the serum, arising from the spontaneous decomposition of milk, possesses an acid taste, is totally divested of the nourishing properties of milk; and ought to be used only in certain cases of fever, or inflammation. On the other hand, the latter is a pleasant, cooling, beverage, during the heat of summer, and may be advantageously drank by the scorbutic and consumptive.

Scalding Whey is prepared by a simple expedient, adopted in the midland counties, for improving the quality of WHEY BUTTER. It consists in suspending each *meal* of cream, as it is taken off the whey, over the fire, till it become *scalding hot;* care being taken that it may not boil. Thus, the butter is greatly improved; and, if the milk have become rancid or bitter, from the cows having eaten turnips, or barley-straw, such disagreeable taste will be completely removed.

Mustard Whey is made by boiling $1\frac{1}{2}$ oz. of mustard in a pint of milk, and an equal portion of water, till the curd be entirely separated; after which the liquid is strained through a cloth. This preparation is one of the most pleasant and efficacious forms, in which mustard can be taken; the dose being one tea-cupful, which may be sweetened with a little sugar, and taken three or four times in the course of the day.

White-wine Whey is made by pouring equal parts of white wine and skimmed milk into a bason; and, after they have stood for a few minutes, by adding a double portion of boiling water. In a short time, the curd will collect, and subside at the bottom: the whey is now to be strained into another vessel, and sweetened with sugar: a sprig of balm or slice of lemon will greatly improve its flavour. This kind of whey affords a salubrious beverage; and, when taken immediately before retiring to bed, it is particularly serviceable to those who have undergone severe bodily fatigue; or been exposed to the inclemency of the weather; as it will excite a gentle perspiration, and thus obviate a sudden cold or catarrh.

WHINS. See FURZE the Common.

WHIN-CHAT, or *Motacilla rubetra*, L. a bird found on British heaths and commons, during the summer months: it is about five inches in length; the upper parts of its body being blackish, edged with rufous spots, and the lower

extremities are reddish-white; but the legs are black.

Win-chats build their nests early in the spring, near some low bush or stone, where the female deposits five dusky-white eggs, marked with black spots. These birds, subsist principally on insects; and, when fat, the flavour of their flesh is esteemed equal to that of the Ortolan.

WHISKEY, a spirituous liquor, chiefly prepared in Scotland and Ireland, by distilling barley.

With respect to its *relative* salubrity, whiskey is doubtless preferable to any home-made brandy drawn from malt; as the former, though strong, is not very pungent, and, if properly distilled, it is free of any empyreumatic taste or smell. A moderate and *occasional* use of it, by way of cordial, after great bodily fatigue, may, to some hard-labouring persons, not be injurious; but, when such practice is carried to excess, as in Scotland and Ireland, it deserves severe animadversion; and, though the legislature has wisely imposed heavy duties on the distilleries, we fear that the immense consumption of this liquid fire, can be prevented only by the most vigorous measures. If, however, the lower classes of people cannot be legally restrained in their vicious propensities, the only remedy left to the power of government, would be the prohibition of employing *grain* for such vile and destructive purposes. See the article Spirits.

White. See Colour-making, vol. ii.

White-bean. See Hawthorn.

White-Bottle. See Spatling-poppy.

WHITE-SWELLING is a tumor of the joints, but chiefly of the knee: at first, it is not perceptibly enlarged; being of the same colour as the skin; very painful, and diminishing the power of motion. There are two species of this disorder, namely, the *rheumatic*, and *scrophulous*. As it is of the first consequence to distinguish these maladies, the origin of which is essentially different, we shall state the symptoms peculiar to each.

The *rheumatic* white-swelling is attended with acute pain over the whole joint; and which is increased by heat: the patient finds the greatest relief in a relaxed position; the tendons become rigid; and the joint appears as if the bones were enlarged. The tumor increases to three or four times the size of the knee, and feels elastic to the touch; while the limb decreases, or sometimes becomes dropsical: at length, abscesses are formed, discharging matter which soon degenerates into a fetid ichor. Unless, therefore, a cure be timely effected, the patient is attacked with a hectic fever, which generally closes the scene of misery.

In the *scrophulous* kind, the pain is more acute, and confined to *one spot:* as the disorder gains ground, the swelling, and stiffness increase, while the ends of the bones become visibly enlarged. Similar elasticity is perceivable, and abscesses are likewise formed, which, on being opened, discharge an offensive humour: the bones decay, and pieces are often ejected through the orifices of the wounds. The adjacent parts become progressively affected, till the sufferings of the patient are also terminated by the hectic fever.

As the distinction above pointed

out, sufficiently explains the proximate causes, we shall only mention those which occasionally occur; and the principal of which are, suppressed perspiration; injudicious treatment of cutaneous disorders; especially of the measles, small-pox, rose, &c.; external violence, such as falls, blows, and frequent kneeling.

Cure....In the rheumatic white-swelling, which, at first, is of an inflammatory nature, it will be advisable to adopt a cooling regimen. Farther, blood should be taken from the diseased part, by cupping or scarification; a practice which is far preferable either to venesection or to the application of leeches; and it may be repeated according to the strength of the patient, and urgency of the symptoms. Next, a blister must be applied to the opposite side, and kept open, till the scarified part is healed.

Internally, mild cooling laxatives should be occasionally taken, and heating liquors, as well as coarse food, must be strictly avoided. If a stiffness of the knee remain, after the swelling has subsided, great benefit will be derived from the application of pure, warm olive oil, and from gentle frictions, repeated three or four times every day. But where suppuration has already taken place (which may be ascertained by the softness of the tumor); or, if the disorder make rapid progress, professional advice should be speedily procured.

In the *scrophulous* white-swelling, the treatment specified under the head of SCROPHULA, should be resorted to without delay. When this affection is confined to the smaller joints, it has by those means, been sometimes cured; but, when the larger joints, for instance, the knee, ancle, &c. are thus diseased, amputation is the only remedy. If, however, the whole system be tainted with a scrophulous acrimony, even that operation is frequently ineffectual.

WHITE-THORN. See HAWTHORN.

WHITE-WASHING, is the act of cleansing ceilings and walls, with a solution of lime in water, to which a little size is occasionally added.

The practice of white-washing apartments eminently contributes to the preservation of health: hence we would recommend the proprietors of cottages, to enjoin their tenants regularly to perform this operation, at least once annually. In countries abounding with lime, the expense will be trifling; and, even though the article should be purchased, the whole cost will not exceed one shilling. It ought to be remarked, however, that *hot* or *quick-lime* is preferable to any other, and must be employed as soon as possible after it is slacked; for, by attending to this circumstance, its effects, in destroying vermin, and removing INFECTION, will be considerably increased.

WHITING, or *Gadus merlangus*, L. a well-known fish, of an elegant shape, rarely exceeding 10 or 12 inches in length, and generally weighing from eight to sixteen ounces.

During the spring, extensive shoals of whitings frequent the British seas; but seldom come nearer the shore than within half a mile, or retire farther from it, than about three miles. They are caught in considerable numbers by the hook and line, and afford great diversion: in the rivers Thames and Medway, these fish are pro-

hibited to be taken, if less than six inches in length; nor are they allowed to be caught at any season, excepting from Michaelmas to Ember-week.

As an article of diet, the whiting is justly valued; being exceedingly delicate, tender, and nutritious; so that it affords proper aliment for invalids, and persons having a weak digestion.

Whiting, in Mineralogy. See Chalk.

WHITLOW, or Whitloe, a painful swelling of the extremities of the fingers, beneath the nails, and usually terminating in a discharge of serous fluid, that is frequently so acrid as to corrode the periosteum, or membrane lining the bones, which thus become carious. It is always attended with inflammation, and sometimes to so violent a degree as to affect the whole arm.

Where whitloes arise from external causes, it will be proper to apply emollient poultices, in order to affect a suppuration. Should such tumors, however, proceed from unknown causes, it will be advisable to apply a few leeches, and afterwards ardent spirits, or other astringents; but, if the bones have already become carious, a total or partial removal of the affected part can alone effect a cure. The following preparation has been extolled, as being very efficacious in common cases of whitloes; though we cannot vouch for its success: Take equal parts of pellitory of the wall, previously bruised, and hog's-lard; let them be properly mixed, folded in several papers, and surrounded with wood-embers, of such a degree of heat as to incorporate the ingredients, without burning the covering. The ointment, thus prepared, must be spread on a piece of soft linen, and applied to the whitloe, two or three times every day, till the tumor be healed.

WHITLOW-GRASS, the Common, or Nailwort, *Draba verna*, L. a native plant, growing on walls and in dry pastures; blowing in the months of March and April. According to Dr. Withering, the Nailwort is one of the earliest flowering plants, and may be used as salad. It is also eaten by horses, sheep, and goats; but not relished by cows, and is totally refused by hogs.

Whortleberry, the Red. See Bilberry.

WIDGEON, the Red-headed, or *Anas ferina*, L. a bird of passage, frequenting fenny places in the winter season: its breast is black; the back and coverts of the wings are of a pale grey, intermixed with narrow black lines; and the legs are of a lead colour.

Widgeons subsist on small fish of every kind; their flight is rapid: and they frequently associate with wild Ducks, Teal, and other aquatic birds. Considerable numbers of the former fowl are exposed for sale in the markets of the metropolis, under the name of *Dun Birds*, and are greatly esteemed at the tables of the luxurious.

Wild-briar. See Dog-rose, the Common.

Wild-climber, the Great. See Traveller's-joy.

Wilderness. See Maze.

Wilding. See Crab-tree,

Wild-parsley. See Milk-weed, the Marsh.

Wild Pear-tree. See Hawthorn.

Wild-radish. See Radish.

Wild-rocket. See Rocket.

WILD-TANSY. See SILVER-WEED.

WILLOW, or *Salix*, L. a genus of trees comprising 42 species; 22 being indigenous, of which the following are the principal:

1. The *viminalis*. See OSIER.

2. The *caprcata*. See SALLOW. Beside the purposes to which this species may be applied, its soft, white, and smooth wood, is used for making handles to hatchets, prongs spades, and other rural implements: it also furnishes shoe-makers with *cutting* and *whetting-boards*, on which they cut leather, and sharpen the edges of their knives. In Sweden, the young bark is not only used for tanning, but also, in combination with that of the alder-tree, for dyeing linen-yarn of a fine black colour.

3. The *purpurea*, *v. Helix*, *v. monandra*, ROSE, PURPLE, or RED WILLOW, grows in hedges, watery places, and the sides of rivers, where it blossoms in the months of April and May. Its long, slender, and flexible shoots, are manufactured into baskets, cradles, and other articles of wicker work.... This species eminently deserves to be cultivated in the sandy banks of rapid streams; as it is one of the most useful trees for consolidating loose soils, and even drift-sands.

4. The *triandra*, or SMOOTH WILLOW, grows to the height of from 6 to 10 feet, in moist woods, hedges, and the banks of rivers; flowers in the month of April. Its bark, in doses of from one to two drams, have been successfully employed in agues.

5. The *pentandra*, SWEET, or BAY-LEAVED WILLOW, is found in forests and hedges, principally in the North of England, where it flowers in April. The wood of this species remarkably crackles in the fire; the young shoots are eaten by sheep and goats; the leaves afford a yellow dye; and the pliant branches are converted into hampers, or the larger kinds of baskets. For medicinal purposes, the bark from young trees is even preferable to that of the preceding species. Lastly, the down of the seeds, when mixed with one-third part of cotton, has been found to be an useful substitute for that vegetable wool, in the manufacture of stockings, and other articles.

6. The *vitellina*, GOLDEN, or YELLOW WILLOW, abounds in *oster-holts*, and flowers in May.... Its shoots are used by cradle or basket-makers; its white, tough, pliant twigs, are employed by nursery men and gardeners, for tying up the branches of wall and espalier-trees. The wool surrounding its seed-vessels, when mixed with cotton, affords excellent yarn for various manufacturing purposes.

7. The *amygdalina*, or ALMOND-LEAVED WILLOW, grows on the banks of rivers, where it flowers in April or May; and a second time in August. The tough branches of this species are employed like those of the preceding.

8. The *fragillis*, or CRACK WILLOW, attains a considerable height in moist woods, hedges, and on the banks of rivers; it blossoms in April or May....This tree grows with uncommon luxuriance, and will admit of being *cropped* every year: it has received this name from the remarkable brittleness of its branches; which, if stricken with a finger, break off at the shoot of the current year. The

bark of these branches, possessing uncommon bitterness and astringency, has been recommended as a substitute for the Peruvian: it is certainly preferable to that of all other native trees; and, if given in doses about one-third exceeding the proportion of such expensive drug, it may, with advantage, be used where the latter is indicated. When administered in powders, of from one to two drams, it has also proved efficacious in removing intermittent fevers. On account of its early blossoms, which are very grateful to bees, it should be raised near their hives: a decoction of the roots imparts a reddish brown colour.

9. The *herbacea*, or HERBACEOUS WILLOW, is the smallest tree of the willow kind; its stem not exceeding 2 feet in height, and the branches being scarcely one foot long. It grows in moist, mountainous situations, chiefly on the sides of Snowdon, and the mountains of Westmoreland, Yorkshire, and Scotland; where its yellow flowers appear in July. This species is, according to HOFFMANN, fondly eaten by horses and other cattle.

10. The *rubra*, or RED WILLOW, is a very scarce species, being found wild only in the Osier-holt, between Maiden head and Windsor: it flowers in the month of May. There is a variety of it, known under the names of the Norfolk, Hertford, Hereford, and Broad-leaved, Red-hearted Huntingdonshire Willow, which may advantageously be planted in moist situations, on account of the luxuriance and rapidity of its growth. The tough, light wood of this tree is employed for gates, hurdles, and other agricultural implements: the pliant twigs are in great request for making baskets, cradles, and also for tying up wall fruit-trees.

11. The *cinerea*, or SALLOW-WILLOW, is the most common of the kind, abounding in moist hedge rows, and woods; where it attains the height of more than six feet, and blossoms in April. This species is chiefly remarkable for its beautiful flowering branches, which are gathered about a week or ten days before Easter, and sold under the name of *palms*.

12. The *alba*, WHITE or COMMON WILLOW, abounds in woods, hedge rows, in wet meadow, and pasture-grounds, where it attains a considerable size; flowering in the month of April. Its blossoms are eagerly visited by bees; its leaves and young shoots are eaten by horses, cows, sheep, and goats: the wood is employed in making poles, hoops for casks, stakes, and likewise for fuel: the bark communicates a cinnamon colour to yarn, and is not only advantageously used in tanning leather, but has also, like that of the Crack and Smooth Willows, been successfully administered in agues.— The Rev. Mr. STONE ("*Philosophical Transactions of the Royal Society*," vol. liii.) directs such bark to be gathered in the summer, when it abounds with sap, and to be taken in doses of one dram, every 4 hours, between the fits: in a few obstinate cases, Mr. S. found it necessary to mix one-fifth part of Peruvian bark with that of the Common Willow. As this tree frequently grows in wet, marshy, situations, where agues are most prevalent, its bark promises to afford a valuable substitute for the foreign drug, especially as the price of the latter has lately been so exorbitant, that

the poor cannot easily procure it; while its quality becomes every year more impaired, by base and fraudulent adulterations.

Beside these indigenous species, there are two exotics, which deserve to be mentioned:

1. The *Babylonica*, or WEEPING-WILLOW, is a native of the East, whence its culture has been introduced into Britain. It flourishes by the sides of rivers, attaining to a considerable size; and its long, depending branches, contribute greatly to diversify the scenery: it is raised chiefly for ornament.

2. The Dutch Willow has lately been transplanted into England. Its wood is chiefly employed for posts, rails, gates, &c. to which purposes it is well adapted.

All the species above enumerated, delight in moist situations, excepting the sallow, which thrives better in a dry soil. They may be easily propagated by planting *sets*, *cuttings* or *truncheons* of willows, abont 6 years old, either in spring or in autumn; as they speedily take root, and in the course of a few years, amply repay the expense and trouble bestowed on their culture. In order to ensure success, the truncheons ought previously to be steeped in soft water, for a few days: both ends must then be obliquely smoothened; the upper part be covered with soil, and exposed with its orifice towards the east. The earth should be moderately compressed with the foot, around the stem, so that it may more readily absorb moisture: in the third year, the top should be cleared, to promote the growth of the bark. The *Yellow Willow*, however, ought never to be planted too near *wells* or *springs*, because its spreading roots retard their course: thus, Mr. BORDLEY (in his "*Essays and Notes on Husbandry*," &c.) mentions an instance, in which a spring was completely choked up, by their rapid absorption of water. On the contrary, this species may with advantage be propagated in swampy situations; as its roots tend to consolidate the ground; and, after a few years, the soil will generally be converted into a firm meadow.

[The *salix latifolia*, or broad-leaf willow, possesses greater medicinal properties than any of the other species of salix; and is now substituted by many British physicians for the Peruvian bark. Dr. WILKINSON, has published a dissertation on this species, and from his work the following account is taken.

"This species of salix may be distinguished by the shape of its leaves from all others, except the *S. Pentandra*, or bay-leafed willow. The leaves of the latter are smooth, and shining, of a deeper green, and have not the downy appearance on the under surface, which is so remarkable in the *S. Capreata*. It is found in woods and hedges on hilly situations, and delights in cold, clayey, moist grounds.

"The most proper time to gather the bark, is in May or June; it should be cut in small pieces, and dried in the shade.

This bark is very astringent to the taste, and somewhat bitter, but it looses the latter quality when dry: the tormentil root has nearly the same taste, but is more astringent. It gives out its virtues more freely to soft water in decoction,

than in infusion: Dr. WILKINSON directs one ounce and a half of the coarse powder of the bark, to be infused in one quart of water, for six hours; then to boil it over a gentle fire for a quarter of an hour, and strain for use.... The dose two or three large table spoonfuls, three or four times a day; but in the ague and fever, one or two ounces may be given every third hour in the interval of the fit. When boiled with a small quantity of *Juassia root*, it is rendered much stronger.

"Dr. W. relates a number of cases of the successful use of the decoction, in cases of general debility, or relaxation of the body from various causes, and in which bitters and tonics are usually prescribed; and in some instances with benefit, after the common remedies had failed: in particular, p. 99, he relates a case of extreme emaciation from an ulcered foot, which was perfectly cured, after having resisted the continued use of Peruvian bark, and the exertions of the physicians of two public charities."

It is not known whether the *salix latifolia* is a native of the United States, but it deserves the attention of our medical men in the country, for if found native, they might also substitute it for the Peruvian bark, and other foreign bitters.]

WILLOW-HERB, or *Epilobium*, L. a genus of plants consisting of 13 species, 8 being indigenous; of which the following are the principal:

1. The *hirsutum*, GREAT HAIRY, or LARGE-FLOWERED WILLOW-HERB, or Codlings and Cream, is perennial: grows in moist hedges; ditches, the banks of brooks, rivers, and lakes; where it flowers in July. The young tops of this vegetable possess a delicate odour, resembling that of scalded codlings: but which is so transitory, that after they have been gathered five minutes, their fragrance is entirely dissipated. Horses, sheep, and goats eat the plant; though it is not relished by cows, and is wholly rejected by hogs. According to BECHSTEIN, this herb remarkably absorbs the inflammable air generated in moist situations; so that it deserves to be cultivated in the neighbourhood of dwellings on marshes, both on account of such useful property, and its large beautiful purple flowers.

2. The *angustifolium*, or ROSE-BAY WILLOW-HERB, is also perennial, being frequent in woods and hedges; where its rose coloured flowers appear from June to August. This species is eaten by sheep, cows, and goats; but is refused by horses and hogs. An infusion of the leaves produces intoxicating effects; though the suckers of the roots, when properly dressed, afford a wholesome dish. The inhabitants of Kamtschatka brew a kind of ale from the pith of this plant, which they convert into vinegar; and the down with which its seeds abound, has in combination with cotton, or fur, been advantageously manufactured into stockings, and other articles of wearing apparel: this fibrous substance may also be profitably employed as a material for making paper.

WIND, is a perceptible agitation or commotion of the atmosphere, occasioned by a strong current of air from one region to another.

The temperature of climates being greatly modified, by the winds;

and navigation depending almost entirely on their influence, the origin of this powerful agent has naturally engaged the attention of many inquisitive naturalists: hence different theories have been framed with a view to account for the cause of these changes; but, as none of the conjectures appear to us conclusive, or satisfactory, we shall briefly state the effects produced on the human frame, by this airy meteor......Thus, a south wind debilitates and relaxes the whole system; and disposes the body to catarrhal diseases: on the contrary, the north wind invigorates the animal fibre, and remarkably contributes to health; because it dissipates noxious vapours, while it purifies the air, and renders it serene....Winds blowing in the earlier parts of the day, are of a drying nature; and, consequently, walking in the forenoon is more salutary than at any other period; whereas the evening breezes, being generally damp and cool, are less beneficial both to the healthy and infirm: besides, the latter are frequently accompanied with rain....The relative salubrity of these various winds, however, greatly depends on local circumstances: for, if they blow across the sea, over mountains, or continents, they necessarily convey, and communicate to the atmosphere, a greater or less degree of cold or humidity....See also ANEMOSCOPE; CLIMATE; and WEATHER.

WIND, or BROKEN WIND, a disorder incident to horses: in this affection, they cannot breathe freely, and their natural functions are impaired: it is usually preceded by a dry cough, and may be known by the animals eating litter, and swallowing frequently copious draughts of water.

Farriers are by no means agreed, respecting the cause of this malady: Mr. GIBSON attributes it to an injudicious or hasty method of feeding young horses, especially those for sale; so that their *lungs*, and the other organs contained in the chest, become preternaturally enlarged; in consequence of which, the chest is not sufficiently capacious to admit of their due expansion. According to his advice, the diseased animal should be bled two or three times; when its bowels must be opened by a dose of calomel, and the following balls be given for several days:....Let 8 oz. of *aurum mosaicum* (which consists of equal parts of mercury, tin, sal-ammoniac, and sulphur); 4 oz. of myrrh, and an equal quantity of elecampane, both reduced to powder; bay-berries and aniseed, each 1 oz.; with half an oz. of saffron, be triturated together, and made into balls, with a sufficient quantity of oxymel of squills..... This preparation may be divided into 12 doses; but, as the *aurum mosaicum* is a tedious and expensive preparation, either 8 oz. of pulverized squills, or a similar portion of gum-ammoniac, or 4 oz. of each, may be safely substituted.

Mr. GIBSON directs the food of broken-winded horses to consist principally of corn, slightly moistened with urine or pure water; and, if two or three cloves of garlic be given with each meal, they will afford great relief; as that root stimulates the solids, and dissolves the viscid fluids, which impede the action of the lungs.

Mr. TAPLIN, however, conjectures that broken-wind originates

from obstructions in the minute vessels of the lungs; which are occasioned by foul feeding, want of sufficient exercise, and inattention to cleansing the intestines of horses, by occasional purgatives; so that the elasticity of the whole system is impaired. He is therefore of opinion, that a cure can only be effected in an early stage of the disease; and, with this view, he recommends frequent, but moderate bloodlettings, which should be succeded by a regular course, or three doses, of the following purgative balls, namely: Take of Socotrine aloes, nine drams, jalap and rhubarb, of each $1\frac{1}{2}$ dram, gum-ammoniac, calomel, and ginger, of each 1 dram, and 60 drops of oil of juniper. These ingredients are to be carefully incorporated, and formed into 3 balls, with a proper quantity of syrup of buckthorn. Three days after the operation of the third dose, Mr. Taplin directs one ball, prepared in the following manner, to be taken every morning, for such a period as will enable a person to judge, whether there be any prospect of recovery: Take 8 oz. of the best white soap, 3 oz. of gum-ammoniac, and a similar quantity of guaiacum, 2 oz. of aniseed, and the same portions of liquorice, myrrh, and Benjamin; also balsam of Peru, Tolu, and oil of aniseed, of each $\frac{1}{2}$ an oz. these articles are to be compounded into a mass, with Barbadoes tar, and divided into 20 doses, or balls.

Throughout the whole treatment of this malady, whether Mr. Taplin's or Mr. Gibson's directions be followed, it will be advisable to allow but little hay and water, lest any accumulation should take place in the intestines......The animal should likewise be moderately exercised; and the greatest precaution taken to prevent a cold. Thus, it will speedily be ascertained, how far a total or partial cure may probably be obtained.

Wind-flower. See Anemone.

WIND-GALL, in farriery, signifies a windy swelling, on both sides of the back sinew, above the fetlocks, in the fore or hind-legs of a horse; though these tumors may likewise arise in various other parts of the body.

Wind-galls are generally occasioned by strains or bruises on the sinews; which, on being overstretched, produce ruptures of the fibres; but, if these swellings happen in the interstices of large muscles, and appear distended, similar to air bladders, they may be safely opened, and dressed as a common wound.

On their first appearance, windgalls should be treated with restringents, and covered with bandages; hence, the tumefied parts ought to be bathed twice a day with strong vinegar; or the swelling may be fomented with a decoction of oak-bark, pomegranate, and alum, boiled in verjuice; applying to it a roller previously soaked in this liquid. Some farriers employ red-wine lees; others use currier's shavings moistened with the former, or with vinegar, as a substitute for the bath and fomentation.

Should, however, these applications prove unsuccessful, it has been recommended to open the parts affected with an awl, or by means of a knife; or, which is still preferable, to apply mild blistering plasters, that will effectually dis-

charge the confined humour; disperse the inclosed air, and gradually accomplish a cure.

WIND-INSTRUMENTS, or those which must be played by the *breath*, are generally opposed to such as are *stringed*, or those of the vibrating kind.

The principal wind-instuments are the fife, flageolet, flute, French-horn, hautboy, bag-pipe, clarionet, and trumpet....Playing on the most fashionable of these, is esteemed an elegant acquirement; but we deem it necessary to remark, that though the occasional indulgence in such practice, may afford an innocent and agreeable relaxation, yet it should not be too frequently enjoyed: for, as the muscles of the abdomen, are thus necessarily contracted, the circulation of the fluids is impeded; and asthma, cough, pulmonary consumption, or other fatal maladies, are often the melancholy consequence....... See also FLUTE.

WINDMILL, is a contrivance for grinding corn, or raising water: it is put in motion by the action of the wind upon its sails, or vanes.

In the 55th vol. of the "*Gentleman's Magazine*," for 1785, we meet with an account of a windmill for *raising water*, by Mr. MERRIMAN. It is furnished with a large sail, affixed to a mast, that inclines to the horizon, and thus imparts motion to certain pieces of machinery termed *braces*, which are connected with *forcers*; so that every gale of wind will act on the apparatus, and raise a greater or less quantity of water. During tempests, the mast will bend, and the sail yield to their force; so that when their violence is abated, the upper parts are restored to their original position, without injuring the works.....The mechanical description of such contrivance being foreign to our plan, the inquisitive reader will consult the work above cited.

As wind-mills essentially contribute to agriculture and domestic convenience, we shall present our readers with a delineation of a specimen of those empoyed in the vicinity of Lisbon; because the construction of their sails is in some respects different from, and, in the opinion of Lord SOMERVILLE, superior to, those used in Britain.

The advantages of mills, on this construction, are stated by his Lordship to be the following:

1. That the broad part of the sail is at the end of the lever, or branch, and thus an equal resistance may be overcome with less length of branches, or arms. These being consequently shortened, a considerable weight of timber will be rendered unnecessary, and a material saving of expense, be obtained, in the height, prime-cost, and subsequent repairs of the mill.

2. The sails, constructed on the plan above represented, may be *set* to draw in a manner similar to the *stay-sails* of a ship; and, as they are swelled more than those in England, Lord S. remarks, that they will render it unnecessary to bring the mill so frequently to the wind; a practice which, in machines of the usual construction, is always attended with considerable trouble.

In November, 1783, a patent was granted to Mr. BENJAMIN WISEMAN, for his invention of sails, with horizontal levers, designed to communicate motion to windmills.

His patent is now expired; but, as a description of such machinery would be unintelligible without the aid of engravings, the reader is referred to the 4th volume of the "*Repertory of Arts*," &c.; where his specification is illustrated by two plates.

A patent was likewise granted in December, 1795, to DANIEL MAUNSEL, Esq. for his invention of a horizontal windmill, upon new principles, for grinding corn, and for other purposes: an account of his complex machinery is inserted in the 7th vol. of the work above cited, and elucidated with two engravings.

WIND-PIPE, or *Trachea*, is a tube composed of cartilaginous rings, and situated in the fore part of the neck, before the gullet. After descending to the third or fourth joint of the back, it divides itself into two branches, called *bronchiæ*, which enter the substance of the lungs, and there spread themselves in numberless ramifications, terminating in the air-cells, that constitute the chief part of the lungs. Towards the posterior part, the rings are fleshy, or fibrous; in consequence of which structure, the wind-pipe is enabled to shorten or lengthen itself, as well as to dilate or contract the diameter of the passage. The internal surface is lined with a very sensible mem-

brane, which, like the whole trachea, is continued from the *larynx*, being the upper part of the former, below the root of the tongue; and lubricated by means of numerous glands. This membranous form facilitates the descent of food; and, by its contraction and dilatation, enables us to expel and admit the air in greater or smaller quantity, and with more or less velocity, as may be required, in speaking or singing.

The affections to which this part is exposed, are but few. Thus, if acrid or corrosive vapours, or exhalations, have been inspired, demulcents, and mucilaginous drink, for instance, oil, milk, or linseed tea, should be swallowed in copious draughts, and the steam of the same liquids frequently inhaled; or, the throat ought to be diligently gargled with them, in order to sheath the internal surface, and prevent the inflammation. For this purpose, a spoonful of the following mixture should be taken at short intervals; namely equal parts of sweet-oil, syrup of violets, and honey of roses, properly incorporated. But, if the inhaled vapours have been of a corrosive nature, such as those of arsenic, aqua-fortis, &c. the treatment recommended under the article Arsenic, should be immediately adopted.

Sometimes improper substances, such as crumbs of bread, coarse dust, &c. enter this passage; and, though they may often be expelled by a fit of coughing; yet great precaution is necessary, that such effort be not too violent; because ruptures of blood-vessels, or instant suffocation, have often been the melancholy consequence. Should, however, the substances fallen into the wind-pipe, be pointed, or of large dimensions, they generally produce fatal effects; unless relief be timely obtained by an operation, which has occasionally proved successful....See also Gullet.

With respect to *inflammation* of the wind-pipe, we refer the reader to vol. iv. p. 358.

WINDOW, an aperture left in the walls of houses, with a view to admit the light, and which is generally provided with glass, disposed in sashes.

A patent was granted in May, 1783, to Mr. William Playfair, for his method of making bars for sash-windows, of copper, iron, or any mixed metal, containing copper. Although the term of his privilege is now expired, yet as a mere description would be insufficient to explain the manner in which the requisite forms are imparted to the metals, the curious reader will consult the 8th vol. of the "*Repertory of Arts*," &c. where a full specification is inserted and illustrated with an engraving.

Another patent was obtained in 1801, by Mr. David Young, of Connecticut, in North America; for a new mode of raising sash-windows. His contrivance is remarkably cheap and easy: it consists simply, in boring three or four holes in the side of the sash, and inserting in them common bottle-corks, so that the latter shall project about the 16th part of an inch. Such corks press against the window-frames, along the usual groove; and by their elasticity, support the sash at any requisite height...See also Country-house; Farm-house, &c.

[The proper distribution of windows in a house, is an object of

great importance. The following just observations on the subject of LIGHTING APARTMENTS generally, are taken from Mr. JAMES MALTON's late elegant work entitled "*Collection of Designs for Rural Retreats*," a work which cannot be too warmly recommended to the consideration of all who are about to build. The common rules observed by builders in the United States, in the arangement of windows, exhibit any thing except taste and utility.

"Experience and observation," says Mr. MALTON, "have determined me to be decidedly of opinion, that the cheerfulness of rooms depends chiefly, if not intirely, on the mode of *conveying* in the light; not on the *quantity of it*. It is not abundance merely that makes it cheerful; an apartment may be too light, it may be glaring. Furniture, dimensions, and proportion, may have considerable influence in making a room cheerful, but all these aids combined are insufficient when light is ill diffused.

"I am fully satisfied, *that an apartment is made cheerful by a sufficiency of light* flowing in from a CENTRE. Convinced of the above position, I have throughout the designs contained in this work (Designs, &c.) uniformly aimed, wherever it was necessary to consider beauty especially, to throw the light into the rooms from the middle of a side or end, as either best suited. In internal areas, light is more attracting, and first engages attention, it is therefore that light should be central; and is best situated, when opposite to the door by which an apartment is entered.

"A moderately sized well-proportioned room, sufficiently lighted from one window in the middle of a side or end, will be cheerful, from the united circumstances, of immediately drawing regard to a centre, by that regard not being distracted by rival lights; and by the light being uniformly distributed over the space it is confined in. These objects are best effected when the apartment is lit from a bow in the middle.

"An apartment to be well lit, should have the light to flow in uninterruptedly; this it does not do when the walls are thick, and jaumbs are kept square; the jaumbs should be splayed to convey the light well into an apartment. If a room be large, and cannot be handsomely lit from one opening of light, there should be then three openings, or five or seven; the middle should be distinguished by an opening, not by a pier.

"In the smaller class of town-houses, where three windows cannot be introduced into the drawing room; by the adoption of splayed sides, three advantages will be obtained, setting aside the more elegant appearance to the eye, the room would be better lit, the middle pier would be greatly reduced, and the necessity would be avoided of battening so much, to receive the necessary depth of boxing to contain the shutters.

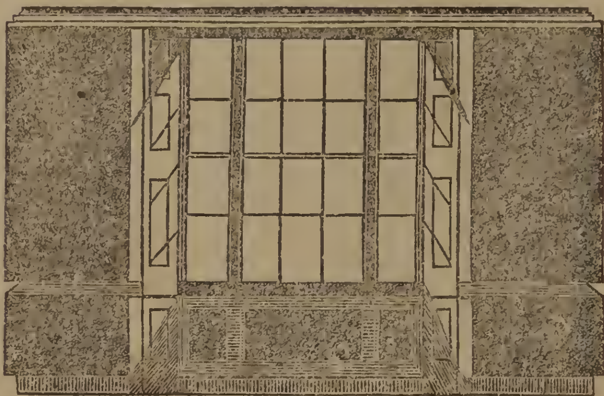
"It is a mistaken notion that by the extra sized side piers, made in consequence of having but one window in the side of a room, the corners next the light are very dark. But I *have observed* it not to be so, and I know *theoretically*, from the reflection of light, that it will not be so. The great and brilliant body of light emitted through a middle window, strikes

centrally on the opposite side of the room, and is reflected back again with adequate force and brightness ; and inasmuch as that centre is light, so will the opposite side be also, by reflection."

Mr. MALTON (and with great propriety) appoints the space over the chimney piece for the looking glass, instead of the pier, between the windows.

" How one window can be made handsome, and even to appear more elegant than two, I shall next explain.

" I propose that in rooms up to 20 or 21 feet in front, within, but one window only, be employed ; which window, if not a bow, may be such as are represented in the following Cut, and which might be variously ornamented, agreeably to the general elegance of the apartment.



The above is for a 16 feet front : The proportion is one and two thirds the breadth of glass of two separate windows. The small pilasters between, might be fluted or otherwise ornamented ; the lower pannels of the splayed shutters might be plates of looking-glass, or the windows might be down to the floor, and finished in the utmost style of elegance."]

WINE, is an agreeable, spirituous, aromatic liquor, prepared by fermenting the juices of those vegetables which contain saccharine matter. Its constituent parts are : 1. *Sugar*, or the sweet juice, usually termed *must*, from which the liquor is obtained ; 2. *Alkohol*, or pure spirit, that is disengaged during the vinous fermentation ; and 3. *Water*, which is the most in-

nocuous part of the whole, and tends to moderate its properties, that may otherwise prove hurtful.

A receipt to make an excellent American Wine, by Joseph Cooper, *Esq. of Gloucester county, New Jersey.*

"I put a quantity of the comb, from which the honey had been drained, into a tub, and added a barrel of cyder, immediately from the press; this mixture was well stirred, and left for one night. It was then strained, before a fermentation took place; and honey was added, until the strength of the liquor was sufficient to bear an egg. It was then put into a barrel; and after the fermentation commenced, the cask was filled every day, for three or four days, that the filth might work out of the bung-hole. When the fermentation moderated, I put the bung in loosely, lest stopping it tight might cause the cask to burst. At the end of five or six weeks, the liquor was drawn off into a tub; and the whites of eight eggs, well beat up, with a pint of clean sand, were put into it: I then added a gallon of cyder spirit; and after mixing the whole well together, I returned it into the cask, which was well cleaned, bunged it tight, and placed it in a proper situation for racking off, when fine. In the month of April following, I drew it off into kegs, for use; and found it equal, in my opinion, to almost any foreign wine: in the opinion of many judges, it was superior.

"This success has induced me to repeat the experiment for three years; and I am persuaded, that, by using clean honey, instead of the comb, as above described, such an improvement might be made, as would enable the citizens of the United States to supply themselves with a truly federal and wholesome wine, which would not cost a quarter of a dollar per gallon, were all the ingredients procured at the market price; and would have this peculiar advantage over every other wine, hitherto attempted in this country, that it contains no foreign mixture, but is made from ingredients, produced on our own farms."

We shall now state the method, in which *Foreign* wines are obtained from the fruit of the vine. See also Vine.

When the grapes are sufficiently ripe, they are gathered, and submitted to the action of a press; from which their juice runs into vessels furnished for that purpose. Here it remains for several hours, or for a few days, according to the temperature of the atmosphere: when the fermentation commences, the liquor rises, and a considerable portion of fixed air, or carbonic acid gas, is evolved. At the expiration of some days, the fermentation ceases: when the liquor becomes clear, and cool, it is poured into other casks or vessels, where it undergoes a slight degree of a new fermentation; in consequence of which, it becomes divested of all feculent particles, while its taste and flavour are remarkably improved. In order to clarify it still farther, the Albumen, or whites of eggs, Isinglass, &c. are either suspended or dissolved in the cask; and various other expedients are practised, most of which have already been stated in the article Clarification, as well as in different parts of this work: a summary of these

materials, the reader will find in the *General Index of Reference*..... With the same view, it has been recommended to filter turbid wine through fine sand laid on a sieve; but, as the mucilage of the foul liquor speedily fills up the interstices, the following method may be preferably employed: it consists simply in *showering* such sand on the wine, through a sieve; so that the weight of this mineral may carry along with it, and deposit all the mucilaginous and gross particles of such wine..... Should, however, any matters accidentally remain, Dr. DARWIN directs a little gum-arabic, or a few whites of eggs, to be added; after which the *sand-shower* is to be repeated, till the fluid become perfectly clear.

The *colour* of wines is, in general, independent of their properties; being in many instances *artificial*, and imparted to those liquors, after they have come into mercantile hands. Thus, white wines are tinged *red*, by decoctions of logwood, the juices of elder and bilberries; in France, by the husks of tinged grapes; and, when a proper colouring matter is required, solutions of stick-lac, and turnsol, have been proposed as useful substitutes. There are, however, other ingredients frequently employed by unprincipled persons, and which produce deleterious effects on the human system. As it is of great importance to expose such adulterations, we shall communicate a few simple means, by which they may be discovered, both by the taste, and by the eye. Thus, if new *white* wine be of a sweetish flavour, and leave a certain astringency on the tongue; if it have an uncommonly high colour, which is at the same time disproportionate to its *nominal* age, and to its real strength; or, if it have an unusually pungent taste, resembling that of brandy, or other ardent spirits, such liquor is generally sophisticated....Farther, when *red* wine presents either a very *pale*, or a very *deep* colour; or possesses a peculiarly tart and astringent taste; or deposits a thick crust on the sides or bottoms of glass-vessels, it has then probably been coloured with some of the substances above mentioned; and which may be easily detected, by passing the liquor through filtering paper; when the tinging matters will remain on its surface. Such fraud may also be discovered, by filling a small phial with the suspected wine, and closing its mouth with the finger: the bottle is then to be inverted, and immersed into a bason containing pure water; when, on withdrawing the finger from its aperture, the tinging or adulterating matter will pass into the water, so that the former may be observed sinking to the bottom, by its greater weight.

Wines frequently become tart, and even sour, in consequence of the fermentation having been mismanaged; or by keeping them in improper places; or from unforeseen accidents: in these cases, cyder, or the juice of carrots and turnips, is commonly mixed with the liquor, to overcome its acidity; but, as such juices do not always sweeten the wines to a sufficient degree, the latter are often adulterated with *alum*, or with *sugar of lead;* preparations, that cannot fail to be productive of the worst effects; as they doubtless are *slowly operating poisons*. Hence we deem it our duty to give an

analytical account of the principal *tests*, or *test-liquors*, discovered by ingenious chemists, both for the health and satisfaction of our readers.

If wine be adulterated with *alum*, M. Beraud directs a small quantity of the suspected liquor to be mixed with a little lime-water: at the end of ten or twelve hours, the compound must be filtered; and, if crystals are formed, it contains no alum: in the contrary case, the residuum, after filtration, will split into small quadrilateral segments, that will adhere to the paper on which it is spread.

In order to detect the *litharge*, or *sugar of lead*, 10 or 12 drops of a solution of yellow ORPIMENT and quick-lime should be poured into a glass of wine: if the colour of the fluid change, and become successively dark-reddish, brown, or black, it is an evident proof of its being adulterated with lead. As orpiment, however, contains a large proportion of Arsenic, it is apt to produce effects equally fatal with those resulting from the sugar of lead: we shall, therefore, subjoin a few other tests, which are perfectly harmless. Thus, Fourcroy (" *History and Memoirs of the Royal Academy of Sciences at Paris, for the year* 1787," &c.) directs a few drops of vitriolic acid, or of pure saccharine acid, to be introduced into a certain portion of the suspected liquor. These will cause the lead to sink to the bottom of the glass, in the form of white powder; which, if laid on a piece of *solid* charcoal, may be reduced to metallic globules, by means of the lamp and blow-pipe. Nevertheless, he preferably recommends a solution of hepatic gas in distilled water: this, he observes, will, on being added to wine sophisticated with lead, produce a black sediment, and thus shew the smallest quantity of that metal; whereas, in *pure* wine, no precitation will take place: the precipitate of lead may be readily distinguished from that of other minerals, by its deep colour.

Dr. Watson (" *Chemical Essays*," vol. iii.) advises 1 oz. of quick-lime, and half an ounce of flowers of sulphur, to be boiled in one pint of water: when the liquor is cold, it must be carefully bottled up; and, on adding a few drops to the wine, or cyder, impregnated with lead, the colour of the whole will become of a lighter or deeper brown, according to the quantity held in solution. But, as this test also precipitates iron, when dissolved in any vinous fluid, we think the following *probatory liquor* may be preferably employed: it was invented and published in 1791, by Dr. Hahnemann, but the merit of his claim has lately been assumed by an obscure German chemist in London; and we understand, that the recipe for this test has been surreptitiously sold to a French speculator, on whose account it is now retailed by several venders, under his directions. Dr. H.'s original test has, within the last three or four years, been simplified and improved, so that it is now prepared in the following manner: Let one dram of the dry liver of sulphur, and two drams of cream of tartar be shaken in two ounces of distilled water, till the whole become saturated with hepatic gas: the liquor must now be filtered through blotting paper, and kept in a phial closely stopped. In order to try the purity of wine, from 16 to 20 drops of this *test* are to be

poured into a small glass: if the wine become only turbid, with white clouds, and a similar sediment be deposited, it is then not impregnated with any metallic ingredients. Should it, however, turn muddy or black; its colour approach to a deep red; and its taste be at first sweet, and then astringent; the liquor certainly contains the sugar, or other pernicious preparation of lead. The presence of iron is indicated by the wine acquiring a dark-blue cast, similar to that of pale ink; and, if there be any particles of verdigrease or copper, a blackish-grey sediment will be formed. In making all these experiments, the test ought to be newly prepared, and the trials made in the open air.

A small portion of *sulphur* is always mixed with white wines, in order to preserve them: but, if too large a quantity be employed, the wine thus impregnated becomes remarkably intoxicating; oppresses the organs of breathing; and excites intense thirst; while cutaneous eruptions, palpitation of the heart, gout, and numerous other nervous affections, are often induced. Sulphur may, however, be easily detected: for, if a piece of an egg-shell, or of silver, be immersed in the wine, it instantaneously acquires a black hue. Quick-lime is also frequently mixed with wine, for imparting a beautiful deep-red colour: its presence may be ascertained, by suffering a little wine to stand in a glass, for two or three days; when the lime, held in solution, will appear on the surface, in the form of a thin pellicle or crust.

The last, and certainly the least hurtful adulteration of wine, is that with water, which may be detected by throwing into it a small piece of quick-lime: for, if the lime be slacked, the wine must have been diluted; as, on the contrary (which however will seldom be the case), such liquor may be considered as pure.

The moderate use of wine certainly conduces to health, especially in weak and languid habits: hence it has been emphatically termed the "milk of the aged:" it accelerates the circulation; invigorates both the bodily and the mental faculties; increases the action of the stomach; and is of essential service to convalescents, especially to those who are recovering from the severe attacks of typhus, or other malignant fevers. On the other hand, intemperance in wine is productive of DRUNKENNESS, or INTOXICATION, with all their attendant evils, and not unfrequently lays the foundation both of acute and of chronic disorders: the mental powers are impaired; and lingering death only terminates the sufferings of the debauchee. Hence, we seriously advise parents, to beware of giving wine to their children *indiscriminately;* because, to them, it can be of service only when taken as a medicine: and those injudicious persons, who encourage young people to take wine *habitually* at their meals, are guilty of an abuse, which cannot be easily repaired by future abstinence.

WINNOW, or more properly, WINNOWING-MACHINE, is a contrivance employed for separating, by an artificial current of air, the chaff from the grain, after it has been thrashed out of the straw.

In the year 1797, a patent was granted to Mr. S. W. DIX, for his invention of a winnowing-machine, designed to clear grain from the

straw, instead of thrashing. It consists of an upright square frame, furnished with a hopper for receiving the corn, *while in the ear*: the grain is separated from the chaff, by means of the friction of a large circular rubber. The implement is set in motion by a pair of ribbed rollers, connected with the main axle, by a band or strap; and this axle is turned by the aid of a common hand-winch.

The advantages resulting from the use of this contrivance, are by the patentee stated to be as follow:

1. No grain will be scattered; and the farmer will be enabled to carry in one waggon, *ten* times more corn in the ear, in sacks, and *without* the straw, than possibly can be conveyed *with* the straw, at one load.

2. As the same quantity of corn may thus be conveyed in one day, as is usually performed in ten, it follows, that not only *nine* days labour, both of men and cattle, may be saved, but also the risk of wet weather, which frequently injures the grain, and increases the expense of housing, is in this manner effectually avoided.

3. The corn being in the ears without any straw, and such ears being rough, it will lie *lightly*, so as to admit a free current of air: hence, *sweating* and *shrinking* of the grain will be prevented; which accident often happens, when managed according to the prevailing method.

4. The ears of corn, thus separated from the straw, will occupy incomparably less room in the barn; consequently farmers will be enabled to guard it more completely from the depredations of rats, mice, and other vermin.

5. The *reed*, or prime straw, being thus preserved in a sound state, will be more fit for thatching, collar-making, the manufacture of hats, &c. for it is neither broken nor split, as generally happens when the flail is employed: at the same time, all the *natural* chaff remains in an integral state for feeding cattle.

Lastly, every grain is by means of such contrivance separated from the ears: thus, the advantages of a thrashing and winnowing machine are combined; and Mr. Dix is of opinion that every farmer, who adopts the various methods proposed in the specification of his patent, will find an increase of produce, far exceeding the most sanguine expectations.

It is, however, to be justly apprehended, that most agriculturists who are already provided with large barns, and who are accustomed to submit their corn to the action of the flail, in the manner of their forefathers, will not be disposed to introduce *new* methods, unless convinced of their superiority, by the most decisive result of experience. And, as we cannot, in this instance, produce vouchers to attest the excellence of Mr. Dix's plan, we decline entering into any examination of its merits.

[Winnowing machines, or *fans*, as they are called, were first introduced into Philadelphia by Adam Echard, forty or fifty years since, from a Holland model. Some years since, a Mr. Every presented a model of the same machine to the *Society of Arts* in London, and obtained a premium of 50 guineas for the invention. It is represented in Bayley's *Plans of Machines*, folio. Excellent fans are constructed in Philadelphia.]

Winter-cresses, or Winter-

Rocket. See MUSTARD, the Hedge.

WIRE, is a cylindrical piece of gold, silver, copper, iron, or other metal, forced and drawn through holes of an iron frame: it is made of various sizes, according to the purposes for which it is designed.

WHITEN-TREE. See SALLOW.

WITHERS, a term in farriery, denoting the juncture of the shoulder-bone, at the bottom of the neck and mane. This important part of the horse's body, is liable to bruises, generally occasioned by a narrow saddle; frequently forming imposthumes; and, if improperly treated, becoming fistulous.

On the first appearance of the swelling, it should be bathed with hot vinegar, three or four times in the day: but, if this fomentation be insufficient to disperse the tumor, an ounce of oil of vitriol may be added to a quart of vinegar, or half an ounce of white vitriol dissolved in a small portion of water, may be mixed with the former liquid, and the compound be applied to the part affected. If the swelling be attended with pain, heat, and small watery pustules, it ought to be bathed with the following preparation: Take 2 oz. of crude sal-ammoniac, and boil it in a quart of lime-water: when it has subsided, pour off the decoction, and add to it half a pint of spirit of wine; after which, the tumor should be dressed with linseed oil, or elder-ointment, in order to soften the skin.

In critical swellings, however, repellents should, on no account, be resorted to; but it will be proper to apply suppurating poultices. Experienced farriers advise, never to open these tumors till they spontaneously burst; as otherwise the excoriation will become spongy, discharge a bloody ichor, and speedily degenerate into a foul ulcer. Where fungous flesh happens to be troublesome, and the matter discharged is of a yellow colour, and an oily, viscid, consistence, pledgets soaked in the following composition have proved very successful: Dissolve half an ounce of blue vitriol in a pint of water; add oil of turpentine, and rectified spirit of wine, each 4 oz.; white-wine vinegar 6 oz.; oil of vitriol, and oxymel of verdigrease, each 2 oz. Farther, let the tumefied part be washed with a mixture of spirit of wine and vinegar. But, when the cavities of the wound are fistulous, the callosities must, if practicable, be extirpated with a knife, and the remainder destroyed by escharotics.

WOAD, or *Isatis*, L. a genus of plants comprehending six species, of which only the *tinctoria*, or Wild Woad, is a native of Britain. It is biennial; grows in corn-fields, principally at New Barns, in the Isle of Ely; where it flowers in the months of June and July. The stalk attains a height of from 3 to 4 feet; and the leaves are eaten by cows, but refused by horses, goats, and sheep: these leaves are highly valued by dyers, for the beautiful blue colour which they impart to wool; hence, this vegetable is cultivated to a considerable extent.

Woad prospers in a deep, fat loam, though a moderately rich and mixed soil is the most proper: as this plant remarkably exhausts the ground, more than two crops should never be taken in succession. The land ought to be ploughed four times; first, shortly before the winter; a second time in the spring, when it will be advisable

to form the ridges; a third time in June; and, lastly, towards the end of July, or early in August: in the intervals between each ploughing, it will be necessary to harrow the soil, so that all weeds may be destroyed.

Woad, in this country, is sown early in August, and generally broad-cast, though the drill-husbandry is the most advantageous. At the end of two or three weeks, the plants must be hoed, at the distance of at least six inches; after which they will require no farther attention, except a careful weeding in October, and particularly in the month of March.

The proper time for gathering the leaves, is determined by their full growth, and the first change of colour at their points: they are cut with an edged tool, and collected into baskets by women and children. If the land be good, three or four successive crops may be taken; but the two first are the finest, and produce from 25*l.* to 30*l.* per ton; whereas, the third or fourth do not sell for more than 7 or 8*l.* per ton. After the leaves are gathered, they are submitted to the action of mills, similar to those employed for grinding oak-bark; and in which they are reduced to a kind of pulp. The woad is then laid in small heaps, which are closely and smoothly pressed down. As often as the crust, formed on the outside, cracks or separates, it is again closed, to preserve the strength of the colouring matter. In this state, it remains for a fortnight; at the expiration of which, the heaps are broken up; the external part is worked into a mass, and the whole is formed into oval balls, either by the hand, or by means of moulds. The balls are now exposed to the sun, under shelter: when perfectly dry, they are ready for sale; or are prepared for the vat, in the manner stated in article Dyeing....Such is the process which woad undergoes, before it becomes fit for dyeing *blue* colours; but M. Astruc is of opinion, that, if this vegetable were cured in the same manner as indigo, it would produce a colour of equal lustre to that obtained from such an expensive foreign drug. Thus, considerable sums of money, that are annually exported for indigo, might probably be saved; a conjecture which is now corroborated by the test of experience.....Dambourney directs to boil the fresh leaves of woad with diluted bullocks' blood, or more effectually with caustic soap-boilers' ley: in this simple manner, a dark green decoction of a bluish shade will be obtained; and, after clarifying the liquor, it will form a blue precipitate; which, dissolved in oil of vitriol, and properly diluted, imparts a beautiful colour to woollen cloth. Farther, even the leaves, in a state of fermentation with pure water, on adding a small portion of a caustic alkaline ley, afford a fine blue sediment, resembling the true indigo.

[This useful article abounds in the western states, and also in Pennsylvania, according to the report of an experienced native of Britain, who is settled near the head of Ohio, in Washington county, Pennsylvania. It appears, that the farina is much richer than that in England; and that instead of two crops, which are produced in England. five are yielded in the United States. This plant is well worth cultivation.]

WOLF'S-BANE, the Large

Blue, or Monk's-Hood, *Aconitum Napellus*, L. is an exotic perennial, growing wild in the mountainous parts of Switzerland and France......The juice of this plant possesses a disagreeable smell and an acrid taste: of the latter, however, it is in a great measure divested by inspissation. Being one of the most active vegetable poisons, when taken in large portions, it excites sickness, vomiting, diarrhœa, giddiness, delirium, fainting, cold sweats, convulsions, and death.

Dr. Stoerk, of Vienna, informs us, that the Wolf's-bane is a very effectual remedy in glandular swellings, the itch, amaurosis, in gouty and rheumatic pains, intermittent fevers, and in convulsions. He prescribed 10 grains of the powder to be taken at night, and in the morning; but the dose is to be gradually increased to six grains of the inspissated juice, twice every day. Other physicians have employed a tincture prepared of one part of the dry, pulverized leaves of this herb, and six parts of spirit of wine; in doses of 40 drops..... In Britain, however, this remedy has not answered the high expectations formed of its virtues: though it doubtless is a very active, and useful medicinal plant, if duly prepared, and regularly prescribed.

A decoction of the roots of the Wolf's-bane, affords an efficacious liquor for destroying *bugs*...if this root be reduced to powder, mixed with oatmeal and honey, or any other palatable vehicle, and thus exposed to rats or mice, it will corrode and inflame their intestines, so as speedily to prove a fatal repast......The juice expressed from this plant, is occasionally poured on flesh, and thus employed as a bait to allure wolves, foxes, and other beasts of prey.

Lastly, it is remarkable, that the best antidote for the poison of the Monk's-hood, is asserted to be the root of the *anthora*, a species of the same genus called *healthful*, or *wholesome Monk's-hood*.

Wolf-fish. See Sea-wolf.

WOLVES-TEETH, in farriery, frequently occur in old horses, when the upper bones of the mouth considerably project over the lower ones: thus, the almost only inconvenience resulting from this circumstance is, that the points of the teeth prick, and lacerate, either the tongue or gums, and thus distress the animal when feeding.....In order to remedy such defect, the superfluous prominences, or unequal points of the teeth, may be filed down; by which simple expedient, these useful bones will be reduced to their natural size.

Wolverene. See Bear.

WOOD, denotes the fibrous substance, of which the branches, trunks, and roots of trees, are principally composed.

[The *Society for the Encouragement of Arts*, in London, bestowed in 1801, a silver medal to Mr. R. Knight of Cheapside, for the discovery of a method of breaking up logs of wood for the purposes of fuel, by blasting them with gunpowder......The following is the mode of procedure.

First, an entrance for an auger is made by a gouge. The auger is then introduced, and a hole bored of a proper depth to receive the rending or blowing screw. A charge of gun-powder is then introduced; a screw, having a small hole drilled through its centre, and a head formed into two strong horns, is then turned into the hole

till it nearly touches the powder; a quick match 18 inches long, is then to be put down the touch-hole till it reaches the charge, and fire set to it, the attendant retiring..... The hole of the screw must be well cleared previously to the introduction of the quick match: this match may be made of a twine, or cotton twist, steeped in a solution of salt-petre.

A strong round bludgeon or stick, must be used to wind the screw into the wood, and a leather thong attached to it, in order to fasten it occasionally to the screw, to prevent its being lost, in case it should be thrown out when the block is burst open; a circumstance which does not often occur; for in all Mr. K.'s experiments, when the wood was tolerably sound, he found the screw left fixed in one side of the divided mass.]

Having already stated the most approved methods of seasoning wood, under the article TIMBER, we shall at present direct our attention to the most advantageous expedients that have been devised for *preserving* this useful substance; and conclude with an account of the best modes of imparting to it different colours.

To render timber more durable, it has been recommended to saw the trees into scantlings; or, where the wood is designed to be used entire, to hew it into the requisite shape; when it is to be laid in a bed of sand (contained in a case or shell of brick-work) and heated by means of a furnace, built beneath. As soon as the wood becomes hot, the sap exudes, and is imbibed by the sand; in consequence of which, the quality of the timber is greatly improved. This method has been successfully tried; but, as it is too expensive, Dr. LEWIS advises all wood, that is exposed to the inclemency of the weather, to be coated with a preparation of pulverized pit-coal and melted tar, reduced to the consistence of paint, which he has found very efficacious. In those cases, however, where piles, or other masses of timber, are subject to the action of water, the most simple mode of preserving it, is that employed in the Bermuda Islands, and other parts of America. It consists in covering such wood repeatedly with train or whale-oil, allowing each coat to become perfectly dry, before another is applied.....For preventing the combustion of wood, the reader will consult the article FIRE-PROOF.

Mahogany, ebony, and the finer woods, being very expensive, artisans have contrived various preparations for tinging timber, so as to be with difficulty distinguished from them. Thus, ebony may be imitated, by boiling clean, smooth box in oil, till it become perfectly black; or, by washing pear-tree wood, that has been previously planed, with aqua-fortis, and drying it in a shady place in the open air; after which, writing-ink must repeatedly be passed over it, and the wood dried in a similar manner, till it acquire a deep black colour. It may then be polished with wax and a woollen cloth, which will give it a fine lustre.

In the new "*Transactions of the Royal Society of Gottingen*," Prof. BECKMANN has published the result of numerous experiments, relative to the staining or dyeing of wood. He directs, for instance, a piece of plane-tree to be put into a glass vessel, containing pulverized dragon's-blood mixed with oil or

turpentine, and placed over the fire: in a short time, the wood will acquire a beautiful colour, resembling that of mahogany; and the dragon's-blood, adhering to the surface, may be separated by applying rectified spirit of wine. If gamboge be dissolved in spirit of turpentine, it will impart a bright-yellow colour; and one part of dragon's-blood, with two of gamboge, communicate various shades to the wood of the beech and plane-trees. A fine walnut-tree tint may be obtained, by rubbing common wood with a mixture, prepared of the bark of the trees, or the shells of walnuts, previously dried, pulverized, and reduced to a proper consistence with nut-oil.

Another preparation for communicating a perfect mahogany-colour to inferior woods, especially those of the elm, maple, and sycamore-trees, consists of the following ingredients: Dissolve two drams of dragons's-blood, one dram of wild alkanet (*Anchusa tinctoria*, L.), and half a dram of aloe, in half a pint of rectified spirit of wine. Previously to using this tincture, the wood ought to be moistened with aqua-fortis; when two or three coats of the former, each being allowed to dry before the next is applied, will be sufficient to produce the desired effect.

In March, 1778, a patent was granted to Mr. HUMPHREY JACKSON, for his method of beautifying, and preserving the colour of every kind of wood, by means of a stain, varnish, and powder. He directs the substance first to be polished with the following composition: Take pumice-stone and burnt alum, of each equal parts; lapis calaminaris, and green-vitriol calcined to redness, of each half a part; let the whole be reduced to a fine *powder*, and rubbed with a woollen cloth on the wood, till it acquire a fine polish: the *stain* must now be prepared as follows: Let 6 lbs. of stick-lac be boiled in three gallons of water, till the colour be extracted, when the liquor ought to be strained: half a pound of madder-root is also to be boiled in three quarts of water: next, half a pound of cochineal, a similar quantity of kermes, and 4 oz. of clean scarlet-rags, are to be digested in a glass vessel, containing one gallon of spirit of wine, and a solution of 2 oz. of pearl-ash in half a pint of water, till all the tinging matter be combined with the liquor. After straining it, the decoction of stick-lac must be added, and a sufficient quantity of aqua-fortis be mixed with the whole, to impart a proper red colour; when the compound may be laid on with a brush.....In order to prepare the *varnish*, the patentee directs one pound of clear white amber, half a pound of copal, a similar quantity of spirit of turpentine, as well as of the oils of rosemary, and lavender; and six pounds of nut-oil, to be digested in a sand-heat, till the oils acquire the consistence of syrup: the liquor is now to be strained for use; and, when the varnish becomes clear, it must be applied to the stained wood with a painter's brush; after which it should be suffered to dry.

A patent was likewise granted, in November, 1791, to SAMUEL BENTHAM, Esq. for his invention of a method of planing wood. Our limits will not admit of an analysis of his diffuse specification: we shall therefore only state that, by his contrivance, the operation of planing is simplified to such a

degree that animals, steam, water, machinery, and other brute or inanimate agents, may be advantageously employed. A minute account of his patent is inserted in the 5th vol. of the "*Repertory of Arts*," &c.

Various other methods of staining wood *blue*, *green*, *purple*, *red* and *yellow*, are practised by artificers. Of these, we shall communicate only the most expeditious, and least expensive.

Blue....Take two drams of the best indigo reduced to a fine powder; put it in a glass with 2 oz. of oil of vitriol, and agitate them with a new clay-pipe.....After standing 10 or 12 hours, at the farthest, in a temperate place, pour it into a large glass vessel, or china bowl, and add such a portion of pure water as may be expedient to give it the tint required....Those, to whom the saving of time is an object, may purchase this staining liquor ready prepared, from the dyer. Another mode of tinging wood blue, is that of dissolving verdigrease in distilled vinegar; then making a separate solution of 2 oz. of pure pearl ashes in a pint of water: the former liquid should be first repeatedly applied to the surface of the wood, till it be of a sufficiently deep green colour; when the latter preparation must be drawn over it, with a soft painters brush, as often as may be necessary to change it to a proper blue cast.

Green:—Dissolve purified verdigrease in distilled vinegar, or in aqua-fortis diluted with 15 or 20 times its weight of water, and apply the solution to wood previously warmed.

Purple: Take 1 oz. of logwood, and 2 drams of Brazil-wood; boil them together in a quart of water, slowly, over a moderate fire: when one half of the fluid is evaporated, it must be strained, and several times laid on the wood, with a proper brush, till it have received a dark-red shade. Thus prepared, and being allowed to become perfectly dry, it may be changed to a fine purple shade, by drawing over it repeatedly a weak solution of the purest pearl-ash, namely, one dram in a pint of water. Some dexterity, however, must be exerted on this occasion; as, by too sudden and frequent applications of either of the two liquids, the colour is very apt to assume a dark blue, instead of a purple shade.

Red:—Take 2 oz. of Brazil-wood, and 2 drams of purified pot-ash; mix them with a quart of water; and let the composition stand in a warm place for several days; stirring it occasionally.—When sufficiently extracted, the coloured liquor must be decanted, moderately warmed, and in that state applied to the wood as many times as may be deemed necessary for giving it a more or less bright cast. Next, a solution of alum, in the proportion of 2 oz. to a quart of water, is to be laid on the wood (while it is still wet from the former stain) with a soft brush, or other instrument.—After polishing the articles thus stained, their colour may be rendered still more beautiful and permanent, by giving them one or more *coats*, with a varnish prepared of shell-lac.

Yellow:—This delicate tint may be easily imparted to wood, which is naturally white: for this purpose, take 1 oz. of pulverized turmeric, and a pint of rectified spirit of wine; shake them in a

glass bottle ; allow the infusion to stand for several days, closely covered : then decant the liquor, and lay it on the wood repeatedly, as may be found necessary.—A cheaper method, however, consists in applying weak aqua-fortis to wood previously warmed, and immediately after the stain is given holding it to the fire, at some distance, till it acquire the desired cast. But it should be remarked, that the aqua-fortis must be sufficiently diluted with water ; as otherwise, the wood is apt to acquire a brown or blackish hue. In order to improve the articles thus stained, the same expedients may be adopted, as those suggested in the preceding paragraph.

To conclude :—As it is frequently an object of some importance, to close and secure the chinks, flaws, or other accidental defects in wooden vessels, in the most expeditious manner, we conceive that a tough paste, composed of whiting, a solution of gum arabic or tragacanth, and a proper quantity of oak-bark reduced to a fine powder, may be advantageously applied to tubs or casks, with a view to prevent farther leaking. But on such occasions, it will always be more advisable to empty the vessels ; and, after drying them, to use a cement, consisting of pitch, bullock's blood, linseed-oil, turpentine, and the finest brick-dust, melted together in an iron pan : before, however, this powerful lute be laid on, all the crevices or chinks ought to be properly *caulked*, or filled up with tow or oakum.

Wood-ashes. See Ashes.

Wood-bine. See Honey-suckle, the Common.

WOOD-COCK, *or Scolopax rusticola*, L. a bird of passage, generally appearing in England toward the latter end of October, and retiring early in March.—It is about 14 inches in length, and, with expanded wings, 26 in breadth; the crown of the head, hind-part of the neck, back, and coverts of the wings, are beautifully marked with ferruginous red, black, and grey colours ; though the breast and belly are barred with numerous transverse lines of a dusky hue.

Wood-cocks, on their first arrival, take up their residence in copses of 9 or 10 years growth ; but seldom continue in one place longer than 12 or 15 days. They subsist on worms and insects, which their long bills enable them to extract from soft grounds, and moist woods. In the evening, these birds repair to pools and springs, whence they retire to open fields and meadows, for the remainder of the night. The sportsman may, therefore, with advantage, take his stand in those narrow passes on the borders of woods, communicating with streams ; or he may watch these fowls about the close of the evening near the pools which they frequent.

As an article of food, the wood-cock affords, to the luxurious, one of the most delicious dishes : its flavour is considered superior to that of the Partridge.

Wood-louse. See Slaters.

WOOD-PECKER, or *Picus*, L. a genus of birds comprising 10 species, 4 of which are frequently met with in Britain : the following of these are the most remarkable.

1. The *viridis*, or Green Wood-pecker, is about the size of a throstle ; of a greenish-yellow shade ; and feeds entirely on in-

sects: its principal employment consists in climbing up and down the trunks or boughs of trees, which it perforates with such exactness, as if the holes were made with human art. After having sufficiently excavated an unsound tree, the female deposits 5 or 6 semi-transparent, white eggs; and the young brood are taught to ascend and descend trees, before they are able to fly.—These active birds are said to occasion great havock among *bees*, in the winter season.

2. The *minor*, or Least-spotted Wood-pecker, scarcely weighs one ounce, being only about 6 inches in length, and 11 in breadth: it is likewise a formidable enemy to bees:—in the winter, this bird frequents orchards, whither it resorts for the purpose of picking up the larvae of caterpillars, and other insects. It also builds its nest in holes of trees, previously scooped out with its penetrating bill; and is known in some parts of England, by the name of *hickwall*.

[This family of birds is remarkable, for the gay and variegated colours of their plumage; as also in the structure and formation of their feet, tail and bill; their short strong feet and position of their toes, and the stiff pointed feathers of the tail, assist them in climbing and attaching themselves to the trunks and limbs of trees, and the beak formed like a hatchet, and wedged, is well adapted for perforating the barks and chipping decayed wood, to obtain their prey. We have nine species in the United States, four of which we shall particularly notice.

1st. *Picus principalis*, (white-billed Wood-pecker, Carpenter.) This is a large bird, above the weight of the domestic hen, and his wings extended, measures near 4 feet, has a high peaked crest of beautiful crimson red feathers, his bill large and strong, wedge shaped and white as ivory. The remaining part of his head, neck and body, black and white. Two or three of these birds working together, will in a short time reduce the trunk of a decaying tree to a heap of chips. They build their nest in the trunks and limbs of trees which they excavate for that purpose.

2. *Picus auratus* (Golden wing Flicca.) This is a fine bird drest in feathers of splendid colours and elegantly variegated. A rich crimson pile covers the back part of the head, which with the upper side of the wings, back and tail, are dusky brown, variegated. The lower part of the neck, joining the breast, is of a dove-blush. Breast and belly yellow, finely speckled with black, and a dark or black cresent lays on the breast. Under side of the wings, and their shaft are of a splendid golden yellow.

Some eminent zoologists have been inclined to establish this bird in the family of *Cuculus*, from the form of the bills and of some of his habits: but we adhere to CATESBY and LINNÆUS's arrangement: for although his beak is not so well formed for hacking wood, yet his general configuration, and habits of language, sufficiently declare him to be of the family of *Picus*.

3. *Picus pileatus*. (Woodcock.) In size next to *P. principalis*, but yet not half so large; of a colour mostly a deep black, having a few spots of white on the quill-feathers. His head ornamented with a high crest of crimson feathers. Cheeks and throat variegated with black, white and yellow feathers: they

utter a loud crowing and screaming noise: their habits, and vigilance in chipping wood is similar to *P. principalis*, and like it, they inhabit forests, and in consequence are become scarce in the cultivated districts: their flesh is eaten, and much esteemed by epicures.

4. *Picus eryocephalus*. (Red Head.) This is a fine bird, about the size of a Jay or Thrush. He has no crown or pecked crest, but the whole head and neck is of a deep and splendid scarlet colour: wings, breast and belly white, quills of wings and tail speckled black and white. They build in hollows of trees near our habitations: they are fond of ripe apples and pears. The red head migrates, leaving us, passing south, generally a few weeks before Christmas, and returns to us the succeeding spring, about the last of April. It is a general observation, that if these birds leave us in the autumn, or early in the winter, it prognosticates a *long and severe winter*. It may be proper to observe, that all the four species here noticed, are passengers in severe winters, retreating southerly. Wm. Bartram.]

WOODROOF, the Sweet, or *Asperula odorata*, L. an indigenous perennial, growing in woods and shady places; where it flowers in the month of May. This plant possesses an exceedingly grateful odour, that increases on being moderately dried: it has a sub-saline, and somewhat austere taste, which, together with a peculiar fine flavour, it also imparts to vinous liquors. According to Linnæus, the smell of this herb, expels *ticks*, and other insects.

The sweet woodroof is supposed to attenuate viscid humours, and strengthen the bowels; to remove obstructions of the liver and biliary ducts; and was formerly esteemed a medicine of great efficacy in epilepsies and palsies. The plant is eaten by cows, horses, sheep, and goats; having the remarkable property of increasing the milk of animals, and especially of those first mentioned. See also Tea.

Wood-sage. See Wood-Germander.

Wood-sorrel. See Sorrel the Common Wood.

Woody-nightshade. See Nightshade.

WOOL, in general, signifies the hairy substance which forms the covering of Sheep.

The growth of wool is always completed in one year, when it spontaneously decays, and is naturally renewed; in which respect it resembles the hair of most of the lower animals; though that of sheep is considerably finer, and grows with more uniformity, each filament advancing at an equal distance; separating from the skin nearly at the same time; and, if it be not previously shorn, it falls off naturally; the animal being already provided with a short coat of young wool, that undergoes similar changes in the subsequent year. Another circumstance, that distinguishes wool from hair, is its various thickness in different parts of the same sheep; being closer at the points than at the roots; and the part, which grows during the winter, being considerably finer than that produced in the summer.

Wool, when first shorn, is called a *fleece*, and every fleece is divided into three kinds, namely: The *prime* or mother wool, which is taken from the neck and back; the *seconds*, or that of the tails and

legs; and the *thirds*, which is obtained from the breast, and beneath the belly.

[Other authorities say, that the back and belly give superfine wool; the neck and sides fine, and that the breast, shoulders and thighs yield a coarse quality.]

The finest and most esteemed sorts of British wool, at present, are those obtained from the Ryeland, South-Downe, Shetland, Cotswold, Herefordshire, and Cheviot-sheep: and as this article forms the most extensive staple commodity of British commerce, various and successful attempts have lately been made to improve its quality. To effect this desirable object, recourse has been had to intermixing or crossing the different breeds; and, by the patriotic exertions of the *British Wool Society*, *the Board of Agriculture*, Lord SOMERVILLE and Dr. PARRY, the British wool is now little inferior to the best kind imported from Spain.

Our limits not permitting us to detail the results of their useful and interesting experiments, we shall only remark, that those who are about to select a flock of sheep, whether for fattening, or chiefly on account of their wool, should not venture to purchase any animals without the assistance of an eminent wool-stapler; for such person, being conversant with the different qualities of wool, is doubtless better enabled to form an accurate judgment, than could be expected from any farmer or agriculturist. Besides, the situations to which sheep have been accustomed, ought to be carefully investigated. Those, for instance, which have been habituated to hilly or mountainous pastures, should not be removed to a verdant plain: nor must the reverse plan ever be adopted; for it is not the gigantic size that constitutes the value of sheep, but an ability to withstand the seasons, together with a disposition to fatten *kindly*, and to produce the largest quantity of fine wool, in poor lands. It is principally by attending to the *natural* habits of this noble animal, that the Spanish wool has acquired such celebrity. But as a complete account of the management of sheep in Spain, would exceed the limits of this work, we shall only recommend to the consideration of our country readers,

Lord SOMERVILLE's "*System followed during the Two last Years by the Board of Agriculture*," &c. 1800; also the 2d vol. of "*Communications to the Board of Agriculture*;" and, lastly, Dr. PARRY's "*Facts and Observations tending to shew the Practicability and Advantage to the Individual and Nation, of producing in the British Isles, Clothing Wool, equal to that of Spain*," &c. 4to. p. 93. 4*s*. Cadel and Davis, 1800.

The utility of wool, as a warm and useful clothing (see CLOTH, FLANNEL, &c.); and when no longer serviceable as a *garment*, its shreds or rags in the manufacture of SOAP, having already been sufficiently explained, it will be needless to enter into farther detail. We shall conclude with briefly stating the different exclusive privileges that have been granted for dressing, preparing, and manufacturing wool, and woollen cloth.

The following are the principal patents of which specifications have been published, namely: 1. In March 1787, Mr. JOHN HARMAR's, for a machine designed to raise a shag on woollen cloth: 2. Mr.

Geo. Jeffrey's, in March, 1791, for a new method of dyeing stuffs, and woollen cloth of various colours: The Reverend Edmund Cartwright's, in May, 1792, for a machine designed to comb wool.

[By this curious and useful machine the following advantages are obtained. Each machine in the course of a day's work of 12 hours work a pack and a half, or 360 lbs. of wool; and the saving of labour is at the rate of 1150*l*. sterling per annum; but the mills are calculated to work by night also.

Five sets of these machines, saved in one year 5750*l*. on the single operation of combing, which is only a preparative operation for the spinning. When worked by night, the profit on the labour of the five machines is estimated at 10,000*l*.

It is represented by a plate in 1st. volume of the *Repertory of Arts*.]

4. Messrs. Henry Wright and John Hawkins, in June, 1793; for their invention of certain machinery, that may be employed in combing dressing, and preparing wool. And 5. Mr. Thomas Contop's, in January, 1795; in consequence of his newly invented machine for batting wool. These various contrivances, however, being too complex to admit of *plain* descriptions, the inquisitive reader will consult the 1st, 2d, 3d, 8th, and 12th volumes of the "*Repertory of Arts*," &c. where full specifications are inserted, and illustrated with several engravings.

[*Process for cleaning, carding, and spinning clothing wool.*

The first thing which is to be done to the wool, when it is put into the hands of the maufacturer, is to clean and free it, as much as possible, from the greasy matter, which, by perspiration, issues from the body of the animal; adheres to the wool; gives it nourishment, and brings it to the requisite degree of maturity.

For this purpose, a liquor is prepared, consisting of three parts rain or river water, and one part of urine: when this liquor is brought to a scalding heat, so as that the hand can hardly be borne in it; about 20, 30, or 40 lbs. of wool, according to the size of the kettle, must be put into a net, and plunged into the hot liquor. It must then be well stirred, and agitated for about ten minutes, so that all the parts of the wool may be well soaked, and the perspirable matter drawn out or loosened by this bouking, that it may be brought out by the washing which is immediately to follow.

But it would be very detrimental in many respects if this bouking water or bath, has not the degree of heat which has been mentioned. For if it were but lukewarm, it would not loosen the animal perspiration sufficiently. And if it were too hot, the sweat would boil into the wool, and only settle the faster. The one, therefore, is as detrimental as the other. It would be much better to have the wool worked up without any bouking or clearing at all, than to have it done under either of those mistakes. For cloth which has been made of wool badly bouked, will never get properly clean in fulling. It must then lie much longer in the earth or soap, which renders it less valuable. There is even a great risk, that it will always remain greasy

and sweaty; because it is difficult to get the sweat out when it is once hardened and boiled in.

The manufacturers know by their own experience, that the fullers, in their own way of working, follow a certain routine, and proceed in the old accustomed manner, which the smallest difficulty will be apt to stop in its progress; and likewise, that these people will not give themselves the least trouble, to obviate, or remedy even the smallest obstacles. It is therefore a great advantage, to deliver them the cloth, as well prepared for fulling as possible.

In order to avoid the too great heat of the water, the wool ought to be cooled, from time to time, by lifting it up above the kettle, with the stick, which is usual for stirring and airing it. In this case, the same care ought to be taken, as is required in dyeing the wool. For either by putting more wood under the kettle, or by taking it away from under it, the water is kept in the necessary temperature as above mentioned.

When the wool has lain a sufficient time in the bouking liquor, and is sufficiently soaked through, it is taken out of the kettle, and thrown in a heap, on a wooden railing or hurdle, where it is left for about half a quarter of an hour to drain. During this time the liquor perfectly penetrates the wool; and it gets sufficiently cool to be fit to be rinsed or washed in the current of a river.

The wool must not be washed whilst too hot, because the cold water would cool it too suddenly; whereby, the sweat that is in it would harden, and then it would not be an easy matter to get it out of the wool. But again, if the wool was to get too cold, the running water would not be able to carry away entirely the sweat which had been chilled and got stiff therein already. It must, therefore, be brought into the run, when it is neither too cold, nor too warm: moreover, the frequent use and the natural qualities of the water, will soon afford the knowledge requisite for this part of the work. That water which has the strongest current, and is the purest, is the best fitted for this purpose, because it takes off the sweat with more certainty, and renders the wool much whiter.

As the wool leaves its sweat or dirt in the bouking liquor, which will form a sediment at the bottom of the kettle, it is proper to strain it by inclination each time it is used; and if the matter is properly carried on, the same liquor may serve for six months.

In Languedoc, the wool is cleared from its sweat by making the bath of common water only, without any addition of urine, and by soaking therein, first, the raw country wool, the sweat or grease whereof perfectly cleanses the Spanish wool, and makes it even whiter than if it had been put into urine.

As both ways of proceeding are equally good, it would be unnecessary to force the manufacturers to clean their wool of the sweat according to the first mentioned method in preference to the second, and so *vice versa*. The only end is, that the wool is to be well cleaned, and it is unimportant whether this be done in the first manner or the second.

The wool which has lain in the warm bath in the manner before described, must, when it is to be

washed, be put into large baskets of wicker work, either round or square. These baskets are 5 or 6 feet long, 4 feet wide, and 3 feet high. In these the wool is carefully washed and frequently stirred, in order that the greasiness and other dirt that may be in it, may be carried off by the current of the water. Out of the first basket it is put into the second; and sometimes even into the third, if it is to be very clean and pure. No more than 6 or 7 pounds must be put into the baskets at once, and this, when it is rinsed clean, is gradually taken out, and other wool put into it, and this may be continued as long as there is wool that wants washing after the bouking in the kettles.

From this circumstantial description, it appears, that the washing of the wool must not be delayed too long, after it comes out of the kettle; for as has been said already, it must be still lukewarm when it is put into the fresh water for rinsing.

After the wool is washed, it is hung up in garrets upon thin rods which are called *drying rods*.... Here it is dried as quick as possible; but this rather to get it out of the way, than from any fear that it should loose any of its quality if it lay long undried. It is not proper to dry it at the fire: the fire might take away the fatness and silky substance in the wool, which is absolutely necessary for the well working of it; but it will do very well to dry it in the sun.

When the wool is dry, it is beaten, that the dust may come out. This work is done either on a hurdle of wooden strips, or on ropes, plaited into a square frame, put upon two tressels. On this 5 or 6 pounds of wool are laid, and beaten with sticks of about an inch thick. The wool is then put into the hands of women who pull it, and pick those parts that stick too closely together: but they must be very careful not to pull the wool to pieces, nor to tear the hair.

These women pick out the coarse lumps, with the bits of straw, thistles, and other things, which frequently adhere so close, that they must be cut out with scissars. It is true this work does not seem to be of any great consequence, nevertheless it is highly necessary, in as much as it prepares the wool, that it may be easily carded; for this reason, great care ought to be taken of this operation.

The wool then comes into the hands of the carders, whose first care is to grease it. They use for this purpose; olive oil, and to one pound of wool, which is intended for chain, they take $\frac{1}{4}$ of a pound; and, to the filling wool the fifth or sixth part. In many manufactures, they make use for this purpose of rape-oil or hog's-lard, but the latter is not as good as the common sweet or olive oil. The former dries and hardens the wool, and makes it so tough, that it is not so good for spinning afterwards, nor is it an easy matter to get the grease again out of the stuffs that have been manufactured thereof. Sweet-oil (olive-oil), therefore, is always preferable wherever it can be had. Amongst the different kinds of sweet-oils, the green Seville-oil is to be preferred, particularly if it be clear and pure.

Carding is one of the most necessary operations, in the manufacture of wool. It is upon this, that the goodness of the cloth

principally depends. For if the wool is not well carded, it is impossible to spin it smooth and even. Many other very bad consequences originate from this cause; for the mixed goods get an uneven colour thereby, and appear, here and there, spotted or striped, if the colours have not been well mixed and absorbed one by the other. Therefore, the dyed wool which is intended to be mixed, must pass once oftener through the cards than white wool. It would be even very desirable if the cards for the last carding, were much finer than for the former, although the manufacturers do not make it a practice.

There are three kinds of wool-cards of the same size. The whole difference depends upon the quality of the iron wire, of which they are made; and the number of teeth in each. Those cards wherewith the wool is to be worked for the first time, are called breaking cards; they must be made of a stronger wire, and the teeth less numerous. The others wherewith the work is repeated once or twice, consist of a finer wire, which, with respect to the wire, are in proper proportion with the former.

The proportion of the strength of the wire and the number of teeth, depends upon the kind of wool which is to be carded.

The teeth of the cards must be perfectly even, in order that the card may not lay hold quicker in one part, than in another: the teeth must be set even and perfectly well fixed and distributed. If there is a fault in this, the wool will be carded better or worse in one place, than in another. As the cards for the first, as well as for the second and third carding, are exactly of one size, it naturally follows, that, the wire in the cards, used for the second and third carding, being finer than that of the first kind of cards, the number of the rows of teeth must be greater, and the teeth in the rows more numerous.

One of the cards is fixed on a wooden bench or frame which serves for a seat for the wool carder, in such manner, that the work, which he has to do, lies before him. The other card he moves backwards and forwards with both his hands, by means of a handle which is fixed on the top of the card.

Before they begin to work with these cards, they ought to be filled with *shear-wool*, for which there are three reasons: First, the shear-wool supports the teeth in the cards, and prevents them from bending: Second, the carder then cannot lay on so much wool on the card at once, and the wool gets better carded. And lastly, if the cards were not filled in this manner, a part of the wool would remain in them, which could not be taken out. The shear-wool which is used for this purpose of filling the cards, is that wool which comes off when shearing the cloth.

The carder performs his work in this manner; he first works the wool with the coarse cards, and afterwards draws it once or twice through the clearing cards. For white wool, two kinds of coarse cards are sufficient; but for wool of mixed colours, three kinds are necessary.

It is to be observed, that too much wool must not be put in the cards at once, because then the wool will not be drawn clear enough. Whether the wool be suf-

ficiently carded, may be known by holding it against the light. If it be well drawn out, it appears thoroughly clear, loose, and lying even and straight: but if it be badly worked, there are little lumps or twists seen in it, which is a certain sign, that the wool was not equally carded.

By carefully observing these directions, well carded wool will be obtained. This is afterwards delivered into the hands of other carders, who work it with small cards, in such a manner, that it is now made into rolls for spinning. This last carding is done on the knees, with small cards, which may be three inches wide, for the wool for the chain, and four inches for the wool for the filling. The difference in the size of the two last mentioned kinds, is therefore necessary; because the rolls for the filling ought to be somewhat thicker than those for the chain; and consequently the wool which is intended for the filling must be spun into a thread about one third thicker or coarser than the wool for the chain.

It is of consequence that this work should be well done, because it is a great assistance to spin the yarn afterwards in that due proportion, which must be observed between the chain and the filling. If this be not done, the manufacture of cloth never can be brought to any perfection, let the care and attention bestowed upon the other parts of the labour be ever so great.

As soon as the wool is converted into rolls, it is delivered into the hands of the spinners.

There are two kinds of spinning, the one for the chain, and the other for the filling. They ought always to be kept separate.

The yarn for the chain must be fine, close, and well twisted, that it may have strength enough to bear the constant motion of the gears, and the strokes of the reed in the box. To this may be added, that it is the chain which binds and keeps together the filling. The proportion of the thickness of the thread between the chain and the filling, which has been observed in the common cloth manufactures, is usually one third; so that if the yarn for the chain weighs 20 pounds, that for the filling must weigh at least 30 pounds, and must be less twisted, because it is intended for the purpose of spreading on the surface of the cloth, and of covering the chain.

The chain and the filling are spun on the same wheels. The wheels made in the Holland fashion are the best, because the frame of the wheel before, is even with the floor, and the hind part thereof is raised about a foot above it, whereby the wheel is kept in a kind of equilibrium, is easily moved, and can be much better governed by the spinners, than if it stood horizontal. Besides this, the spinners who draw their thread from below upwards, are by such a sloping direction, better enabled to observe the inequalities, useless hairs, and little lumps in the wool, than if they had to draw the thread straight towards them."

The following slight sketch will shew the process pursued in preparing wool in the British manufactories, and at the same time, give an idea of the number of people to whom we are obliged for every coat we wear of English

cloth. The fleece is sorted, according to its different qualities, by the wool stapler, and the Spanish has all its pitch marks clipped off. It is then carried to the Dye-house, and when cleansed from its impurities, (by scouring it in a furnace of hot water) dyed, and returned to the manufacturer; afterwards, woven in the loom, burled, by nipping off its knots and burs; milled by the fuller, dubbed with cards of Teazle: [*Dispsacus Fullonum*] stretched on the tenter-hooks; dressed; sheared; pressed between heated planks and press-paper; and packed for the markets. " *Warner's excursions from Bath.*]

WOOLEN CLOTH. See CLOTH.

WORK. See LABOUR.

WORK-HOUSE. See POOR-HOUSE.

WORMS, are the meanest of the lower animals. Those which infest the bowels of the human body, are generally divided into three kinds, namely, 1. the *ascarides*, or small round and short white worms; 2. the *teres*, or *lumbricus*, a round and long worm; and 3. the *taenia*, or tape-worm. Having already treated of the first and third kinds, under their respective heads, we shall now give an account of the second, or round worm.

Symptoms of Worms:...Paleness of the face; itching of the nose; dilatation of the pupil; grinding of the teeth during sleep; voracious, or bad appetite; fetid breath; nausea, while the belly is mostly inflated, hard and painful. Eruptions often appear, particularly on the face: and, in the morning, the patient is affected with a copious flow of saliva, and an uncommon craving for dry food, such as bread, potatoes, &c.

The manner in which worms originate in the human body, is not yet ascertained; but, in general, it has been observed, that they are found principally in persons and children of a weak and relaxed digestion; in such as eat great quantities of fruit, and raw vegetables, as well as in the inhabitants of the sea-coast. Hence persons, who subsist chiefly on fish, are often troubled with worms.

Cure....To expel such as already exist in the body, and to prevent their re-production, it will be advisable to administer strong purgatives and tonics. With the former intention, a variety of medicines have been recommended, and many unprincipled empirics have levied contributions on the credulous; but one of the most efficacious remedies, is a composition of jalap and calomel, when used in the manner directed, p. 92 of this vol. The dose should be repeated twice or three times, during the space of a fortnight. The following treatment has likewise, in many instances, been attended with success. Take of pulverized worm-seed, two drams; jalap, valerian, and Æthiops mineral, of each one dram; mix the whole with a sufficient quantity of treacle, or honey, to form an electuary; of which a tea-spoonful is to be taken twice a day. The operation of these medicines may be considerably increased by clysters, consisting of strong solutions of salt with the addition of oil.

The principal tonics to be used against worms, will be the Peruvian bark, valerian, and steel; but none of these active drugs can

with safety be resorted to, without proper advice. The patient's diet should be duly regulated : his beverage ought to consist of cold water, or sweetened with honey, carefully avoiding new beer, and all fermented liquors.

With regard to solid food, the bread ought to be well baked, and a slice spread with treacle and scraped carrot, garlic, or pulverized wormseed, eaten every morning, has often been productive of good effects. Onions, horse-radish, salted and dried animal food (even sound Dutch herrings, occasionally), as well as spices, and ripe fruit, are here proper articles of food. On the other hand, all such substances as tend to occasion flatulence ; especially white cabbage, pease, dried beans, potatoes, and other farinaceous articles ; for instance, pastry, confectionary, and whatever is of a fat and oily nature, particularly pork, ham, &c. must be carefully avoided.

Children troubled with worms, should take moderate exercise ; and be directed to masticate their food properly. It is farther absolutely necessary, that the motions of their limbs and body should never be constrained by tight garments, particularly those around the belly and hips ; as such injudicious practices cannot fail ultimately to impair their digestion.

[An infusion of the West India plant *Spigelia Anthelmia* is a powerful vermifuge : it is given in infusion, in the dose of two table spoonfuls to children four or five years old ; of the juice, one table spoonful is to be given. From five to ten grains of the dried plant may be given.

The Carolina pink root, or *Spigelia Marylandica*, is a well known and powerful vermifuge. See also CABBAGE TREE BARK, CALOMEL, COUHAGE, MELIA, FERN, TENIA, VERMIFUGE.]

WORMS, or EARTH-WORMS, in husbandry, are very injurious creatures, especially in corn-fields ; where they consume the young roots, and thus destroy the greater part of the crop.

To prevent such depredations, it has been recommended to manure the soil with *soot*, or *salt ;* or to sprinkle it with sea-water ; and, where this cannot be easily procured, with a solution of bay-salt in common water. The brine of salted meat may likewise be employed in gardens ; or, if walnut-leaves be steeped in water for a few days, the fluid will acquire such a degree of bitterness, as to prove a certain poison to reptiles of every description.

WORM, the Glow. See GLOW-WORM.

WORM, the Silk. See SILK-WORM.

WORM, the Tape. See TAPE-WORM.

WORMS, in *Dogs*. See DOGS.

WORMS, in *Horses*. See BOTTS.

WORMWOOD, the Common. See MUGWORT.

WORMWOOD, the SEA, or SEA SOUTHERN-WOOD, *Artemisia maritima*, L. is an indigenous perennial growing on the sea-coasts, and flowering in the month of August.....In its wild state, the odour of this plant is similar to that of the *Marum Germander* (see vol. iii. p. 15.) ; or of CAMPHOR ; but, when cultivated in gardens, it becomes less fragrant. Its virtues correspond with those of the MUGWORT, or Common Wormwood, though in an inferior degree.

The Sea Wormwood is frequently used as an ingredient in distilled waters: when triturated with fine sugar, it is formed into a conserve. This marine plant is eaten by horses; but refused by cows, goats, and sheep.

WORT, is an infusion of malt, from which different kinds of ALE and BEER are brewed.

Wort possesses considerable antiseptic properties, and has often proved an excellent diet-drink, which remarkably promoted the cure of the true SCURVY :....it may also be advantageously used as common beverage, in cancerous ulcers, and in all other cases, where a strong putrid disposition prevails in the fluids.

WOUND, in surgery, is a recent and violent solution of continuity, in a soft external part of the body; being attended with an effusion of blood.....To enter into a *full* discussion of the different kinds of wounds, as denominated from the parts affected, would exceed the limits of this work: we shall, therefore, first give a short account of wounds in general, and afterwards treat of such casualties, according to their particular situations.

The danger attending a wound, depends chiefly on the part which is injured, and on the constitution of the patient. If, however, the heart, any of the large internal blood-vessels, the spinal marrow, or the brain, be wounded, the assistance of an expert surgeon ought instantly to be procured; as the event generally proves fatal. Similar consequences may be apprehended, when nerves proceeding to the heart, are materially injured.

On the other hand, if the wound be superficial, or what is usually termed a *cut*, in the upper or lower extremities, especially in the muscular part of the arm, hand, finger, or in the leg or foot, it will be advisable immediately to compress the wounded part (without examining its size or dimensions), so as to exclude every access of air, and to prevent the efflux of blood: next any tenacious matter, such as glue, shoe-maker's wax, gold-beater's leaf, or the common sticking-plaster of the shops, should be speedily applied. Thus artisans, working with edged tools, very properly treat the frequent accidents of this nature: and, though the wound may extend even to the bone, yet it will in this simple manner, be safely and expeditiously healed. Nay, daily experience evinces, that external injuries of the head, neck, breast, &c. may be successfully treated by a similar method, especially by the aid of slips of adhesive plaster; which, in the latter situation, must be applied to the part during the act of *inspiring*; so that it may not be displaced by the alternate expansion and contraction of the muscles in breathing; and that it may prove no impediment in that important process of the animal economy. Where, however, a wounded part has been neglected, and exhibits rough edges; or, if the skin and muscles have been lacerated, a different treatment must be adopted: in these cases, a *pledget* or *lint* dipped in sweet-oil, should be applied to the injured spot, and the whole covered with a piece of fine oil-cloth. After 24 hours, the first dressing may be removed, without tearing or breaking the small fibres adhering to the lint; when the pledget

ought to be renewed. On such occasions, a proper bandage will be indispensably necessary, in order to promote the juncture of the lips of the wound; but in case the latter shew a disposition to suppurate, the use of oil will be hurtful; as the wound must be treated in the manner pointed out, under the article ULCER.

In *fresh wounds*, or in severe bruises, the application of cold water is strongly recommended by NANNONI, an Italian; and Arquebusade water, [which see] by THEDEN, the first German surgeon. PERCY advises the following efficacious ointment: Take a small glassful of the clarified juice expressed from the green leaves of the burdock, and a similar portion of almond or olive-oil: these liquids must be duly incorporated in a pewter vessel or mortar, by means of a leaden pestle. Thus a green ointment will be obtained. which may be spread on lint or soft linen, and applied to the wound every 12 hours, or oftener. This preparation softens the callous edges of the ulcer, and cleanses the latter, while it equally promotes suppuration and cicatrization. If the fungous flesh grow too rapidly, the simple juice of burdock, without the oil, will be preferable. At each dressing, the pledget or lint may be covered with a fresh leaf of the same plant; which may also be laid on the newly formed scar, with a view to render it more firm. As the unguent above described is in great estimation on the Continent, Dr. UNZER adds, that it may be preserved for a considerable time, when kept in a cool place; or, for long voyages, it should be boiled, and allowed to become cold, two or three different times, till it acquires a thick consistence.

M. DE KESSEL, a respectable German writer, observes from long experience, that new honey spread on folded linen, affords an excellent remedy for fresh and bleeding wounds, which ought not to be washed or otherwise handled; provided they contain no foreign substances; for instance, glass, splinters, &c. If they happen to be deep, or have large orifices, the honey-plaster should be repeated every four or five hours, and after some days, only once in twenty-four. He farther states, that such application not only stops bleeding, but also prevents inflammation, swelling, and suppuration, while it checks the growth of fungous flesh.

In all *open wounds*, it is an object of the first importance, that the patient, especially during the act of dressing them, breathe a pure, salubrious air; for, a foul or contaminated atmosphere, such as that of hospitals, and crowded habitations, always increases the danger; so that small, superficial injuries have, from that source, frequently been attended with fatal effects.

Tight bandages often occasion a considerable swelling of the adjacent parts: in such cases, the roller ought to be very gradually removed; as, otherwise the tumefaction of the compressed places will suddenly increase, and sometimes terminate in mortification. Hence, PETIT recommends the bandage to be renewed every three hours, so that it may each time be less tightly fastened. In wounds which, from their nature, cannot be speedily healed, the use of Goulard-water, or other preparations of

lead, is extremely improper; as they should, from their commencement, be dressed with suppurating remedies. Hence, in all cases of febrile heat, and external inflammation, emollient poultices, composed of the crumb of bread boiled in milk, must be instantly applied, and changed several times in the day; or, as often as they become cold, without disturbing or touching the wounded part with the fingers.

In order, if possible, to obviate the symptoms of inflammation, it will, in some instances, be advisable to draw blood from a vein of the arm or foot; to resort to opening medicines, such as neutral salts, with a few grains of nitre; to apply similar clysters; and, on the whole to observe a cooling regimen. Such treatment is particularly necessary, in consequence of stabs or cuts given with sharp-pointed or edged instruments, and in other wounds proceeding to interior parts. Hence, persons who had been dangerously wounded in the chest, in the abdomen, or in the thighs, have completely recovered [by frequent bleeding,] by abstaining from all animal food, even from broths, and salted and pickled provisions of every description; while they subsisted for several weeks exclusively on barley-water, wort, or other mucilaginous vegetable decoctions; without using any medicines, or applying ointments.

Foreign bodies, such as iron, lead, splinters of wood, glass, linen, &c. should, if possible, be speedily extracted from wounded parts; and, in all serious accidents of this nature, surgical aid ought to be procured without delay. When the wound is not inflamed, such extraction may be promoted by enlarging its orifice with a proper instrument; afterwards immersing the limb in tepid water, or repeatedly applying to it a cloth soaked in a similar fluid. But, if any pointed bodies, for instance, pieces of glass, cannot be thus removed, the wounded part should be exposed to the steam of water, and frequent emollient cataplasms be laid over it, with a view to facilitate the ejection of hurtful matters, by means of a speedy suppuration. As soon as the tumor thus treated becomes soft, and presents a yellowish-white spot in its centre, it must be opened; though such favourable change sometimes requires an attentive treatment, for several weeks.

Wounds inflicted by blunt instruments, or by the grazing of a bullet, or by the large and blunt teeth of animals, provided they be not poisonous, should also be treated in the manner already stated; though it will, in these cases, be useful to apply a pad of folded linen, moistened with sweet-oil, or with a tepid mixture of vinegar and water; because such wounds partake of the nature of *bruises*. With a view to afford greater security, the parts thus bitten, may preferably be washed with milk, or with luke-warm vinegar and water.

There are many instances on medical record, where small wounds of the veins, in consequence of unskilful blood-letting, have been attended with fatal effects: thus, if a tendon, or cutaneous nerve, be injured, or the orifice in venesection be made too small, the whole arm or leg will become inflamed, and the swelling suddenly spread to the points of the fingers or toes. In these cases, the whole limb

ought to be speedily tied up with a proper bandage, and dressed with lead-water; and BRAMBILLA recommends emollient, anodyne, and antispasmodic remedies to be applied to the wounded part...There are, however, instances, where the method before suggested would be insufficient to effect a cure The celebrated HEISTER recommends a mixture of oil of turpentine and spirit of wine, to be applied to such wounded nerves: others advise warm spirituous liquors; and SHERWEN justly praises the efficacy of *warm oil of turpentine*, which is used by country people, in deep wounds inflicted by a needle, or other pointed instrument, with a view to prevent suppuration: and he observes, that cooling and emollient external remedies are unavailing in those nervous casualties, consequent on blood-letting. [See LOCK JAW.]

Persons wounded by *gun-powder*, especially in the face, should not attempt to extract such particles of the powder as may have penetrated through the skin; because they are apt to break, and sink deeper into the muscular fibres: the only application necessary, on these occasions, is Goulard-water, or, more effectually, the ointment composed of oil and lime-water, stated under the article BURNS.

With respect to *gun-shot wounds*, we shall only remark that, according to the experience of the ablest surgeons on the Continent, such injuries are always more speedily healed with oil and emollient cataplasms, than with essences, balsams, and other heating drugs. But, as the opinions of professional men greatly differ on this subject, we must refer the curious reader to Mr. JOHN BELL's late publication, entitled "*Discourses on the Nature and Cure of Wounds*," (8vo. 9*s*.) and shall add a few remarks of Dr. ROBERT JACKSON, extracted from the 11th vol. of "*The London Medical Journal*," where this skilful practitioner expresses himself to the following effect....The practice of dilating, poulticing, &c. of *gun-shot* wounds, appears to be justifiable only in those cases, where it becomes necessary to extract the ball, or the fragment of a bone; or in which inflammation is about to commence. In all other instances, Dr. J. considers dilatation as superfluous, and even as contributing to retard the cure: in his opinion, it is sufficient to bind the wound with linen rags, or similar bandage, to prevent the access of air. Cataplasms, says he, may be serviceable in cold climates; but, in warm countries, bandages moistened with laudanum, or spirituous liquors, and even the affusion of cold water upon wounded limbs, dispose them to heal in a very remarkable manner. He confirms these observations by numerous cases of soldiers who were wounded in the contest with America; and who recovered more speedily by this treatment, than by adopting the practice of dilatation, and suppuration. See also the articles STYPTIC, TOURNIQUET, and [*Geranium Maculatum*.]

Wounds of the *joints*, such as the knee, foot, &c. heal most expeditiously by the simple application of cold water; provided the orifice of such wounds be immediately contracted by means of adhesive plaster. If they happen to be deep, SCHMUCKER advises blood to be drawn from a vein: while he observes, that, by renewing the compresses with fresh water, as

soon as they become warm, such injuries have generally been cured, without producing inflammation, or any other symptom....See also TENDONS.

WOUNDS, in farriery, may be occasioned by various accidents; but, as our prescribed limits do not admit of a minute detail, we shall at present state only the treatment, which may be most advantageously adopted, on common occasions.

In all fresh wounds, occasioned by cutting instruments, it will be sufficient to bring the lips together by ligature, or by suture: after which, rags dipped in brandy should be applied: or the orifice may be covered with a pledget spread with the following ointment: Take of Venice turpentine, and bees-wax, each 1 lb.; of olive oil $1\frac{1}{2}$ lb.; and 12 oz. of yellow resin: let these ingredients be melted together, and 2 or 3 oz. of finely-pulverized verdigrease be added: the whole being stirred, till it become cold.... See also art. HORSE.

In cases of scalds or burns, where the skin remains sound, it will be advisable to bathe the part with camphorated spirit of wine, and to cover it with rags dipped in the same liquor: salt may also be applied to the burn or scald with considerable efficacy. But, if the skin be once broken, the part affected must be anointed with linseed or sweet-oil, and a plaister, consisting of bees-wax and oil, be laid over it. If, in consequence of the pain, a slight degree of FEVER occur, the animal must be bled, and treated in the manner directed under that article.

The most important, and also the most frequent, of the simple wounds, however, are those of *broken knees*: this injury is sometimes occasioned by accident, but more commonly by the negligence of grooms; the carelessness of bad riders on rough roads; or, by exhausting the horse's strength through excessive labour. On such unfortunate occasions, the wounded parts must first be washed with a sponge dipped in warm water, to prevent the inflammation that would otherwise ensue, from the particles of gravel or sand adhering to the flesh :...... next, they ought to be gently wiped with dry cloths, and bathed with a mixture, consisting of equal parts of camphorated spirit of vine, and vinegar: thus cleansed, they should be covered with a pledget of tow, dipped in the same composition. But, if the wound be so deep, as to produce a considerable degree of inflammation, it will be necessary to promote suppuration, and to treat it in the manner pointed out vol. iii. p. 465....For the proper management of the more dangerous wounds, the reader will consult the articles HOOF-BONY, HOOF-HURT, OVER-REACH, PUNCTURES, QUITTOR-BONE, &c.

WOUNDWORT, or *Stachys*, L. a genus of plants consisting of 22 species; 4 being indigenous; of which the following are the principal.

1 The *palustris*, or Marsh-Woundwort. See Clown's ALL-HEAL.

2. The *sylvatica*, or HEDGE-NETTLE WOUNDWORT, is perennial, grows in hedges and woods, where it flowers in the months of July and August....The whole of this plant possesses a fetid smell; and under its shade, toads are said to retreat for shelter. A yellow dye is obtained from its leaves and branches. It is eaten by sheep and

goats; but refused by horses, cows and hogs.....BECHSTEIN observes, that the stalks of the Hedge-nettle Woundwort, when managed in the manner similar to that pursued with *hemp*, afford a woolly substance, which may be spun into yarn; and on bleaching it, becomes remarkably white.

WREN, the COMMON, or *Motacilla troglodytes*, L. is a very diminutive bird, inhabiting all parts of Europe, and especially England, where it maintains itself, during the severest winters. It is from 3 to 4 inches in length; the head, neck, and whole body, are of a deep brown colour.

Wrens construct their nests in the corners of out-houses, stacks of wood, or holes in walls, being nearly of an oval shape, and composed chiefly of moss, lined with feathers: the female lays from 16 to 18 minute white eggs, marked with red spots; and produces two broods in a year....These creatures subsist on small worms and insects: they have a pleasing note in the *pairing* season, as well as in the winter, especially when fed with poppy-seed; and the voice is much stronger than could be reasonably expected from a little warbler which scarcely weighs 3 drams.

WRESTLING, is a wanton combat, or engagement between two unarmed persons, who exert all their strength and dexterity to throw each other on the ground.

Wrestling was in great repute among the ancients; but, with the modern nations, it is seldom practised. Indeed, it is almost forgotten in Britain, excepting in a few of the less civilized counties, where it forms a favourite game at *wakes*. This exercise, however, like that of cudgel-playing, ought to be abolished; on account of the accidents thus wilfully occasioned; for every nerve is strained by the candidates for *rural fame*, who thus frequently lay the foundation of some severe chronical complaint, or meet with dislocations, fractures, and other casualties, which often terminate in lingering illness, or premature death.

WRITING, is the art of conveying our ideas to others, by means of certain characters.

As the history of this noble invention is lost in the remote periods of antiquity, it would be foreign to our plan, to enter into a detail of the opinions and hypotheses that have been formed by antiquarians, with a view to account for its origin....Hence we shall notice the patent which was granted in February, 1780, to Mr. JAMES WATT, for a new method of *Copying Writings*. He directs a piece of thin, unsized paper, of the same dimensions as that which contains the original writing, to be moistened with water; or, which is preferable, with the following liquor: Take 2lbs. of distilled vinegar, and let 1 oz. of the sedative salt of borax be dissolved in it: next, 4 oz. of oyster-shells, calcined to whiteness, are to be put into the vinegar: the mixture must be repeatedly shaken, during 24 hours; when it is suffered to stand till it deposit its sediment. The clear liquor should now be filtered through blotting-paper into a glass vessel; 2 oz. of bruised Aleppo-galls be added; and the mixture kept in a warm place for 24 hours, being frequently shaken: at the end of that period, it must be filtred a second time, and afterwards diluted with one quart of pure water. Now it should again be suffered

to stand for 24 hours; and, if any sediment be deposited, it ought to be strained a third time....When the paper has been moistened with this liquor, it should be placed between two thick unsized pieces of the same material, in order to absorb the superfluous humidity; and, thus prepared, it must be applied to the writing which is to be copied: a piece of clean writing paper being placed over both. The whole is now directed to be submitted to the action of a rolling press: in consequence of which, the written characters will appear on both sides of such moistened paper....The patentee employs a peculiar press, of his own invention; which, however, cannot be satisfactorily described, without the aid of delineation: hence, the inquisitive reader will consult the 1st. volume of the "*Repertory of Arts*," &c.; where this specification is illustrated by an engraving.

[The *Polygraph*, invented by Mr. J. HAWKINS, and improved by Mr. C. W. PEALE, of Philadelphia, is the most simple and complete writing apparatus, yet invented. Two or three copies, (or rather originals) are taken at the same time......The apparatus folds up in a large portable writing desk, and is sold for fifty Dollars.]

Besides the simple method of restoring *illegible writing*, already stated under the article DEED, we shall mention two other expedients, either of which may be used, accordingly as the characters are more or less obliterated: Boil half an ounce of best Aleppo-galls in 4 oz. of water, till one half of the fluid be evaporated; filter the decoction through blotting-paper, and apply it by means of a soft painters' brush, to the effaced part of the writing; on which it must be suffered gradually to dry: thus, the illegible letters will in most cases, become black, and re-appear. If, however, this mode of recovering them should not prove successful, the following application has often effectually answered the purpose: Take a leaf of white unsized paper; moisten it with a strong solution of green vitriol in water; so that it may be *damp*, without being *wet*. Next, apply such paper to the illegible part of the writing, by means of the flat hand, in order to communicate its moisture to the latter; when it must be allowed to dry in the open air. In this manner, the almost dissipated astringency of the galls will be renovated, so that the vanished characters will generally re-appear on the surface. Let it, however, be remembered, that both preparations must not be tried on the same paper; as they would certainly change the whole to a black colour.

WRY-NECK, or *Jynxtorquilla*, L. is a bird of passage, somewhat larger than a lark; of a brown and black colour, with wave-like stripes; appearing in Britain in the spring, and preceding the *Cuckow:* it has received its name from a whimsical habit of turning and twisting its neck, so as to bring the head over its shoulders: it also possesses the faculty of erecting the feathers of its head, similar to those of the JAY.

Wry-necks construct their nests of dry-grass in the hollows of trees: the female lays 6 or 8 white eggs, which have a very thin shell: it is remarkable, that the young brood, while in the nest, utter a hissing noise, not unlike that of *snakes*....

During the period of incubation, the male attentively supplies the hen with *ants*, which furnish to these birds a very agreeable repast.

M. Buffon informs us that, toward the end of summer, the Wryneck becomes exceedingly fat; and that its flesh, in point of delicacy, is equal to that of the Ortolan.

Wymote. See Marsh-mallow.

X.

XANTHOXYLON, Prickly Yellow Wood, or Yellow Hercules, is a native of Jamaica, and other tropical countries, where it grows to the height of 16 feet, and is about 12 inches in diameter..... This straight tree somewhat resembles the common ash: the bark of the trunk is covered with numerous prickles; and the wood is of a bright-yellow cast.

The wood of the Xanthoxylon is chiefly employed for the heading of hogsheads, for bedsteads, and numerous other purposes: it also possesses remarkable medicinal virtues. The fresh juice, expressed from the roots, affords certain relief in the painful disease, termed *dry belly-ache*. This important fact was discovered in the West-Indies, by watching a female slave, who collected the root in the woods, and gave two spoonfuls of its juice to a negro, suffering under that colic, at an interval of two hours. Such medicine occasioned a profound, but composed, sleep of 12 hours; when all sense of pain, and other distressing symptoms, had vanished: the cure was completed, by giving an infusion of such expressed roots in water, by way of diet-drink.

Farther, the juice of the Prickly Yellow Wood, when preserved in rum, and administered in doses not exceeding a wine-glassful, has effectually removed the most obstinate epileptic fits; but Dr. Heney has not mentioned the *manner* in which this preparation ought to be managed.

[Two species grow in the United States.

1. *X. fraxinifolium* or ash-leaved X. growing in Pennsylvania, and Maryland: and *X. calvis Hercules* or Prickly Yellow Wood, which grows in the more southern states.

The bark and capsules are of a hot acrid taste, and when a small quantity is chewed, powerfully promotes the flow of saliva. It is used in this way to relieve the tooth-ache. A tincture of the same

parts of the tree is a common country remedy for the chronic rheumatism.

In the West-Indies, a decoction of the bark is used with great success as an internal remedy, and also as a wash for foul ulcers, which it powerfully cleanses, and disposes to healthy granulations..........The powdered bark is also mixed with the dressings. In the *London Medical and Physical Journal*, vol. 2d. and following, there are several cases related of the efficacy of this medicine in the above disease.

XANTHORHIZA, *tinctoria*, Shrub Yellow Root. Is a native plant of N. Carolina, first brought by the late John Bartram, from that state, and planted in his garden at Kingsess in the county of Philadelphia, where it has continued to flourish in a most luxuriant manner. It is denominated *Simplicissima* by Marshall, *Apiifolia* by L'Herretier, and *Marboisia* by Mr. Wm. Bartram, in honour of Mr. De Marbois.....*X. tincroria* is a more expressive name than any it has yet received.

Dr. Woodhouse has given an excellent account of this valuable plant, in the 5th vol. of the *Medical Repository of New-York*, from which the present extract is taken.

"The stems are three feet high, and somewhat thicker than a goose quill. The root is from three to twelve inches long, and about the diameter of a man's little finger, sending off numerous scions. The leaves are placed alternately, having long petioles and pinnated, terminating in an odd one; the *folioles sessile*, and lacerated deeply on their edges. The *peduncles* are branchy, and are placed immediately beneath the first leaves, from which cause, the flowers appear before the leaves, very early in the spring."

The stem and root are of a bright *yellow* colour, and possess a strong bitter taste.

The *Xanthorhiza tinctoria*, contains a gum and resin both of which are intensely bitter; the resin is more abundant than the gum.

It imparts a drab colour to cloth, and a handsome yellow to silk, but the dye will not take on cotton or linen. The different mordants which were used, altered the shade of the yellow colour considerably, but did not appear to render it more permanent. While every shade of this elegant colour can be obtained from that truly valuable dyeing drug, the *quercitron bark*, (black oak), Dr. W. thinks it will always supercede the *Xanthorhiza*, and every other native dye, among which that of the *hydrastis Canadensis*, may justly be reckoned the most superb.

The watery extract of the grated roots, mixed with alum, and added to Prussian blue, was first used by Mr. James Bartram, for colouring plants, and the plumage of birds of a green colour....The green is far more lively and elegant than that made with gamboge and Prussian blue, which is generally used for painting in water colours, and stands well in the shade, but soon contracts a dull colour when exposed to a bright light, and to a high temperature. Various subjects coloured by this green, and inclosed in a book, were as lively after one year, as when first painted.

It is a strong and pleasant bitter, and preferable to all our native bitters. It sits easy on the stomach, in the dose of two scruples (40 grains.)

The colour of the leaves appears to reside in a resin, which is altered by the combined action of light and oxygen, by either of which, separately, it cannot be affected.

As the Xanthorhiza is a strong and pleasant bitter, and very nearly allied to the columbo-root, it promises to become a valuable addition to the American Materia. It is preferable to all our native bitters. The *Aristolochia Sipho*, (Dutchman's pipe,) is a weak aromatic bitter. The root of *Actea racemosa*, (black snake-root,) is a nauseous bitter. *Chironia angularis*, (Centaury,) *Gentiana Saponaria*, (blue Gentian;) *Veratrum luteum*, (Devil's-bit;) the red berries of *cornus florida*, (dog-wood,) and the bark of several species of salix, or willow, are weaker bitters than the yellow root. Dr. Woodhouse has often used the powdered stem and root of the *Xanthorhiza* with success, in the dose of two scruples to an adult, in many of those diseases in which bitters are recommended, but generally combined with other remedies. It is a medicine, which sits easy upon the stomach, and produces no disagreeable effects.

Reference to the Plate.

A, a branch representing the foliage, flowers, and fruit of the *X. tinctoria.*

a, a flower somewhat magnified.

b, a branchy peduncle, showing the capsules.

c, a capsule.

d, a capsule open, showing the single seed.

f, a portion of the root, sending off a scion.

The Editor is indebted to Dr. Woodhouse, for the use of the annexed plate.]

Y.

YAM, or *Dioscorea bulbifera*, L. is a nativa of Ceylon, whence its culture has been introduced into the West Indies, and other parts of America: it is divided into two varieties, known under the names of *red*, and *white*; from the colour of their bulbous roots.

Yams flourish best on poor soils; and retain their beautiful verdure till a late period in the year: hence, they are said to ameliorate the ground nearly as much as a crop of turnips. Being propagated by setting the *eyes*, their culture corresponds with that of potatoes; and, like these roots, yams often prove an excellent preparatory crop for wheat. Farther, they are very productive; so that the red variety

Xanthorhiza tinctoria

yields, in general, 12 tons per acre: the white sort is less fruitful; but, being more delicate, it is chiefly raised for the table, in the West-Indies.

The culture of these bulbous roots in Britain is, at present, we understand, confined to the counties of Mid-Lothian and Stirling; where they are given to cows; the milk of which is thus considerably increased, without affecting its quality or flavour.

As an article of food, the yam possesses similar properties with the potatoe, excepting that it is less mealy: in a raw state, it is viscous; but, when roasted, this bulbous root is equally wholesome and nourishing, so that the inhabitants of the West-Indies prefer it even to bread. In some respects, therefore, yams are more valuable than potatoes; because the former are much lighter, and more easily digested......when first dug out of the ground, then dried in the sun, and preserved from humidity, in casks full of dry sand, they may be kept for several years, uninjured by frost, and without losing any part of their nutritive quality.... These beneficial roots may also be peeled, deprived of their moisture by pressure, and dried in the same manner as Mr. Millington directs potatoes to be preserved (see vol. iv. p. 326). In this manner, yams may be packed in casks, like flour, and imported in a perfectly sound state, from the West-Indies: when grated, and mixed with wheaten or barley-flour, they may be formed into a light and salubrious *bread*. Nor are they less nourishing, when converted into pottage, or pudding, with the addition of milk. Thus, Mr. R. Pearson ("*Annals of Agriculture*," vol. 35), informs us that the meal, obtained from the boiled and grated roots, when beaten up with milk and eggs, without any flour, yielded a firm and well-flavoured dish; which could with difficulty be distinguished from a common batter-pudding. By this treatment, the yams are divested of their saccharine taste, which renders them at first disagreeable to some persons; though such property, is, on the whole, of considerable use; as it saves the expense of sugar.

YARD, is a measure of length, employed for measuring cloth, stuffs, &c.

The English yard contains three feet, or 36 inches: it is converted into ells English, by subtracting a fifth part, or 7 one-5th inches; and into ells Flemish, by adding one-eighth, or $4\frac{1}{2}$ inches.

YARN, in general, denotes the manufacture of wool, hemp, flax, cotton, &c. converted into filaments or threads, which are subservient to a variety of useful purposes.

Formerly, all yarn was spun or twisted by means of the distaff, or wheel; but lately, both the ingenuity of mechanics, and the powers of machinery, have been called in aid (see the articles Cotton and Spinning), to facilitate that operation: and, in June, 1787, Messrs. John Kendrew and Thomas Porthouse, obtained a patent for their invention of a machine, upon new principles, designed to spin yarn from hemp, tow, flax, or wool. As this privilege is now expired; and such contrivance promises to be very useful in the woollen as well as other manufactures, we subjoin a concise account of its construction.

The machine consists of a frame which supports a cylinder, three

feet in diameter, and ten inches in breadth; made of dry wood or metal; and its circumference being covered with smooth leather. On this, are placed six rollers, also covered with leather, and upheld in their situations by slits made in a piece of wood, in which the iron axis of the rollers move, at the same time suffering them to press on the principal wheel: such rollers are of different weights; the highest on the cylinder weighing two stone, while the others gradually decrease, so that the lowest is only two lbs. in weight. A cloth is placed beneath the cylinder, that revolves upon two rollers, inserted in the frame; and by its side there is a table of an equal length and breadth, furnished with two similar cloths.

The workman lays on this table a greater or smaller quantity of the material intended to be spun, according to the degree of fineness required; spreading it uniformly on the cloths, whence he removes and applies it to the revolving cloth. The rollers and cylinders are then put in motion by wheel-work moved by a horse, water, or any other impulsive power; the flax, &c. is drawn forward, and extended, during its passage, into a thread or sliver; which, on being submitted to the action of a similar machine, but of different dimensions, is spun into thread of various degrees of fineness: after the yarn has thus passed beneath the rollers, it falls into canisters suspended below, for its reception. A minute specification of this useful machinery is inserted in the 16th vol. of the "*Repertory of Arts*," &c. where it is illustrated by an engraving.

YARROW, the Common, or Milfoil, *Achillea Millefoilum*, L. an indigenous perennial, growing in meadows, pastures, and on road-sides; blowing from June till August. The flowers of this vegetable yield an essential oil, which possesses an aromatic odour, a bitter taste, and is similar to that of chamomile. A decoction of its leaves with chamomile flowers is said to form a corroborant diet-drink for children who, on account of their rapid growth, are unable to retain their water, during the night: but for this purpose, from one to two pints of such preparation ought to be taken in the course of 24 hours. Linnæus observes, that the Dalecarlians have a practice of throwing the flowers and leaves of the common yarrow into *beer*, while in a state of fermentation; with a view to increase its intoxicating effects. Bautsch, in Germany, has usefully employed the whole herb, in the process of *tanning*.

The Milfoil being a creeping plant, which spreads uncommonly from its numerous seeds, it often becomes a troublesome weed, if it be once suffered to grow in fields. Nevertheless, Dr. Anderson recommends its culture as a proper food for cattle. It is eaten by sheep and hogs; but it is relished neither by horses, cows, nor goats.

YAWNING is an involuntary opening of the mouth; which is occasioned by weariness, or an inclination to sleep, though it frequently occurs early in the morning, and immediately after rising.

Yawning is performed by extending all the muscles, that are capable of spontaneous motion; by expanding the lungs; by slowly and gradually inhaling a large portion of air, and expiring or breath-

ing it out, after it has been rarefied in the body; and lastly, by restoring the muscles to their natural position. Persons of strong and healthy constitutions are most liable to this natural impulse, when they awake, on account of the perspirable matter that lodges in the pores of the skin: hence BOERHAAVE observes, that yawning appears to be designed by Nature, to move, accelerate, and uniformly to distribute the humours throughout the system; consequently, to render the various muscles capable of discharging their respective functions. Such involuntary motion, therefore, greatly conduces to health; but, if it become habitual, or be too often repeated, especially by persons of sedentary lives, it will be advisable to take a short walk in the fresh air, and to inspire a large portion of that salutary fluid, in *temperate* weather. Sometimes, however, yawning is the fore-runner of convulsions or ague-fits; in which cases, those distressing affections might often be prevented, by adopting timely and proper remedies.

YEAR. See KALENDAR.

YEAST, or BARM, is the froth or scum which rises on beer, during the act of fermentation.

Yeast is an article of the greatest importance in domestic economy; forming a necessary ingredient in *bread*, which would otherwise become heavy and unwholesome. As it cannot at all times be obtained in sufficient quantities, we propose to state various methods which have been contrived, for generating and preserving this commodity.

In the 2d vol. of the "*Memoirs of the Philosophical and Literary Society of Manchester*," Mr. HENRY has published a method of preparing *artificial yeast*, by which good bread may be made, without the aid of any other ferment. He directs flour and water to be boiled to the consistence of treacle; and when the mixture is cold, to saturate it with *fixed* air. Next, it must be poured into large bottles with narrow mouths, which should be loosely covered with paper; and, over this, with a slate and a weight, to keep them steady. The bottles ought now to be placed in a room, the temperature of which is from 70 to 80°; and the mixture be stirred two or three times in the course of 24 hours. At the end of about two days, according to Mr. H. such a degree of fermention will have ensued, that the mixture acquires the consistence of yeast. In this state, the flour, intended to be made into bread, must be incorporated with such artificial barm, in the proportion of 6lbs. of the former to one quart of the latter, and a due quantity of warm water. The whole is now to be kneaded together in a proper vessel, covered with cloth, and suffered to stand for 12 hours, or till it be sufficiently fermented; when it should be formed into loaves, and baked. Mr. HENRY adds, that this yeast would be more perfect, if a decoction of malt were substituted for water.

A *simple* decoction of malt, however, is now fully proved to be convertible into yeast, fit for brewing: this discovery was made by Mr. JOSEPH SENYOR, on whom the *Society for the Encouragement of Arts*, in the year 1790, conferred a bounty of 20*l*. He directs 3 wooden or earthen vessels to be procured, one being capable of

holding 2 quarts, the other 3 or 4, and the third 5 or 6 quarts. A quarter of a peck of malt is then to be boiled for 8 or 10 minutes, in 3 pints of water; when one quart must be poured off the grains into the first vessel: as soon as the liquor becomes cool, such vessel ought to be removed towards the fire, or to a temperature of about 70 or 80° of FAHRENHEIT's thermometer. In the course of thirty hours, the fermentation will commence; when 2 quarts of a similar cool decoction (made, we suppose, from the same malt), must be mixed with this yeast, in the second, or larger vessel; and be repeatedly stirred in the manner practised in common vats. As the fermentation increases, a greater portion of the like decoction must be added, and be worked in the largest vessel: thus, at length, a sufficient quantity of yeast will be produced, for brewing 40 gallons of beer.

This useful contrivance of Mr. SENYOR, is farther confirmed by the recent experiments of a correspondent, whose plain and interesting account we are induced to quote in his own words: "I caused (says he) a gallon of rather weak wort to be made; with part of which, when cool, I filled the middle part of NOOTH's machine: as soon as it was thoroughly saturated with fixed air, I mixed the whole, and placed it in a wooden vessel near the fire, the weather being rather cool. In about 24 hours, there were some faint signs of fermentation; yet, at the expiration of the fourth day, I obtained no more than two table-spoonfuls of very indifferent yeast; and the wort had become extremely offensive. As the yeast was not only very poor, but in too small a quantity for any domestic purpose, I made an infusion of malt and a decoction of hops, in the manner used among the inhabitants of the island of Jersey, when they find it necessary to increase a small quantity of brewer's yeast. To this preparation, I added my two spoonfuls of yeast; let the mixture stand 24 hours; then poured off the watery part; mixed the sediment with an increased proportion of the malt and hops; which fermented, and produced yeast enough to work a gallon of strong-beer, that yielded a pint of very fine yeast, of which excellent bread was made. Having some reason to suspect, that the fixed air was of little or no use in this experiment, and that a wort might be made, which would ferment of itself, before the liquor were spoiled by too long keeping, I caused to be made four gallons of good wort, rather above porter strength, well hopped, and with a considerable quantity of colour, and treacle, to preserve it from putrefaction. It was equally divided, one-half impregnated with fixed air, as in the first experiment; each was put into a wooden vessel; and both were placed in an equally warm situation. At the expiration of 24 hours, there being no signs of fermentation, I stirred in a teaspoonful of salt, and shook a little flour on the surface of each. In 12 hours more, the unimpregnated wort shewed some appearance of fermentation, which went off, and was renewed by placing the liquor near the fire; and at the seventy-fourth hour, it had a tolerably good head of yeast; but the impregnated wort was only beginning to ferment. In 24 hours after, we took a pint of yeast from the wort

which was not impregnated with fixed air, and about a tea-cupful from the other, which was as inferior in quality as in quantity. The worts were then mixed, put into other vessels, and bid fair to become excellent beer. I cannot say that this is a very expeditious mode of making yeast; but I believe it is a sure one, and within the power of every person who can procure the necessary ingredients for making good beer."....Our correspondent, therefore, conceives to have proved by his experiment, "that fixed air is, at least, not requisite to produce a fermentation in beer."

Dr. LETTSOM ("*Hints for promoting Beneficence*," &c. 1797) recommends the following preparation as a substitute for yeast: Boil 4 oz. of flour in 2 quarts of water, for half an hour; and sweeten it with 3 oz. of Muscovado sugar. When the mixture is nearly cold, pour it on four spoonfuls of yeast, into an earthen or stone jar sufficiently deep to admit the new barm to rise: it must now be well shaken; placed near the fire for one day; and then the thin liquor be poured off the surface. The remainder is next to be agitated, strained, closed up for use, and kept in a cool place. Some of the yeast thus prepared, ought always to be preserved, for renewing or making the next quantity that may be wanted.

The following method of preparing *excellent yeast*, we state from the "*Transactions of the Economical Society of Petersburgh*," on the authority of Baron VON MESTMACHER: When the wort is made, and it becomes necessary to provide yeast for its fermentation, he directs forty gallons to be drawn off, into a vessel provided with a lid, and capable of holding one-third more than that quantity. Next, 7 lbs. of leaven are to be dissolved in a little wort, and mixed with the 40 gallons: 17 lbs. of rye-meal, and an equal quantity of ground malt, must now be added, by agitation for some minutes, and suffered to stand for half an hour. At the end of that time, a spoonful of the best yeast ought to be incorporated with this compound; the lid be placed upon the vessel; and the whole remain undisturbed for 48 hours; when the mixture will be found converted into 60 gallons of remarkably good barm.

In the 1st vol. of "*Annals of Agriculture*," Mr. KIRBY suggests mealy potatoes to be boiled, till they become perfectly soft, in which state, they must be mashed with hot water, so as to acquire the consistence of yeast. Two ounces of coarse sugar, or molasses, are then to be added to every pound of potatoes; and, when the mixture is lukewarm, two spoonfuls of barm must be stirred into it, according to the proportion above stated. This composition should now be removed towards the fire, or to a warm place, till the fermentation cease; when a certain portion may be kneaded with flour, which ought to stand eight hours before it is baked. Mr. K. observes, that every pound of potatoes, thus managed, produces nearly a quart of yeast, which will remain good for three months....The roots, however, ought, in the opinion of Mr. BORDLEY, to be perfectly *ripe* and *well-sprouted*; as, in the contrary case, no fermentation will ensue.

Similar to this preparation, is the substitute for yeast contrived by

Mr. RICHARD TILLYER BLUNT; in consequence of which he obtained a patent, in October, 1787. He directs 8 lbs. of potatoes to be boiled in water, in the same manner as for the table: after which, they must be mashed; and, while they are warm, 2 oz. of honey, or other saccharine matter, and one quart of common yeast should be added. Three pints of this compound are sufficient, with the aid of warm water, for making the *sponge;* and, when this begins to sink, the dough ought to be formed into loaves, and baked.

[The great importance of good yeast to the making of wholesome bread induces the editor to communicate several receipts which may be depended on. Any one of them will answer, but it may be useful to enable a choice to be made.

1. Boil a pint bowl full of hops in two quarts of water to one quart; put eight table-spoonfuls of flour into a pan, and strain the hop-water boiling on it; when mixed, it should be thick batter, and when milk-warm, stir in a breakfast-cup of good yeast, pour it into three porter bottles, stopping them with paper; put them in a milk-pan near the fire, and as soon as the mixture rises to the top of the bottles, remove them to the cellar until it subsides, then cork the bottles, and set them on a cool cellar floor, or in an ice-house. In very warm weather, the corks ought to be taken out every day, to let out the carbonic acid air, and the bottles again stopped.

2. Another receipt directs the addition of a table-spoonful of ginger, which is to be boiled with the hops; and the further addition of a table-spoonful of brown sugar before the flour is stirred in.

3. *Perpetual yeast:*.....Mix one pound of flour with boiling water, to the thickness of gruel, add to it half a pound of brown sugar, mix them well together; put three spoonfuls of purified yeast into a large vessel, upon which put the above ingredients, whch will soon ferment. Collect the yeast off the top, and put it into a small necked pot, and cover it from the air; keep it in a dry place, and moderately warm. When used in part, replace it with flour made into a thin paste, and sugar, in the former proportion. It will keep for half a year or more. No yeast is necessary except the first time.... *Columbian Magazine*, December, 1788.

4. The editor can recommend *yeast* made after the following receipt, as preferable to any other kind.

Boil twelve clean washed, middle sized potatoes; and at the same time, boil, in another vessel, a handful of hops in a quart of water; peel, and mash the potatoes in a marble mortar, pour part of the hop-water, while hot, upon the potatoes, mix them well, and pass them through a sieve; then add the remainder of the hop-water, and half a tea-cupful of honey, beat all well, and add a small portion of leaven to bring on the fermentation. Put the whole in a stone jug, and set it by the fire, (in the winter). All the utensils must be scalded every time they are used, and washed perfectly clean. One tea cupful of the above potatoe yeast, will answer for two quarts of flour. In summer, the yeast ought to be made every second day.

The following mode is most commonly adopted out of the great towns in the United States: Four table-spoonsful of bran or shorts, and one of hops are boiled in a quart of water, and set by the fire to ferment. A small quantity of salt to the water, wherewith the flour is kneaded, is an improvement. With this, however, the practice is to use leaven saved from a former baking.

Where bread is made from leaven alone, some sugar should be added to correct the sour taste, and probably a small quantity of pearl-ash, would add to the rising of the bread, as well as correct the acid of the leaven.]

An useful substitute for yeast, may be obtained by nearly filling a bason, or tea-cup, with bruised, or split pease, and pouring on them boiling water: the whole is now to be set on the hearth, or other warm place, for 24 or 48 hours, according to the temperature of the season: at the end of that time, a froth, possessing all the properties of yeast, will appear on the surface of the fluid. This method, we understand, is commonly practised in the eastern countries; and the barm, thus procured, is said to render the bread light and palatable. [See article BREAD.]

To the different modes of procuring yeast, already specified, we shall add an easy and expeditious process, which appears to be very plausible; and has lately been communicated to the editor, by an anonymous correspondent; though he cannot vouch for its success.... Take six quarts of soft water, and two handfuls of wheaten or barley-meal; stir the latter in, before the mixture is placed over the fire, where it must very gradually simmer, and at length boil, till two-thirds of the fluid be evaporated, so that it may consist of two quarts. When this decoction becomes cool, incorporate with it (by means of a whisk) a powder, consisting of two drams of salt of tartar, and one dram of cream of tartar, previously mixed. The whole should now be kept in a warm place.... Thus a very strong yeast for brewing, distilling, and baking, is said to be obtained. For the last mentioned purpose, however, such barm ought to be first diluted with pure water, and passed through a sieve, before it be kneaded with the dough; in order to deprive it of its alkaline taste.

The *preservation of yeast*, for a considerable time, is an object of equal importance to that of producing it artificially: hence, it has been recommended to put a quantity of that commodity into a canvas bag, and to submit the whole to the action of the screw-press, so as to deprive it of all moisture; in consequence of which, the barm will remain in the bag, as firm and tough as clay: in this state, it must be packed in casks, well secured from the access of air, and may be kept in a sound state for any period of time. We believe, however, it would be more safe and advisable to form the pasty yeast into circular, flat vessels, resembling tea-saucers, and in that state to dry the whole mass, either in the open air under shade, or in the moderate warmth of a baker's oven.

Mr. FELTON MATHEW's mode of separating beer from yeast, and preserving the latter (for which he obtained a patent, in February, 1796), in many respects corresponds with that just described:

the principal difference is, that he directs the bags to be placed in troughs perforated with holes, to prevent the former from bursting; and then to submit them to the action of a lever, aided by incumbent weights. When the beer is thus expressed, the yeast remaining in the bags, will crumble into coarse powder: this must be spread on canvas, hair-cloth, or similar porous material, and gradually dried in a malt-kiln, or in any room or stove, where a regular temperature of from 80 to 90 degrees is maintained; and, lastly, as soon as it becomes perfectly dry, the barm must be packed in bottles or casks, from which the air is completely excluded.

Another mode of preserving yeast, consists in throwing a *withy*, or the young shoots of willows twisted together, into the vessel where the yeast is working; and suspending them in a warm room, till the next opportunity of brewing arrives. We conceive, however, the following expedient to be preferable, both in point of cleanliness and economy; it being successfully practised by some careful house-wives: Take a clean wooden bowl, of such size as may be most convenient: spread a regular coating of yeast around its inner surface; and, as often as this dries, repeat the process, till a thick cake be formed: the vessel must be kept in a dry place. When any barm is wanted, a small piece may be cut out; and, after dissolving it in warm water, the solution will answer all the purposes of fresh yeast, whether designed for baking, or for brewing.

The following process being advantageously employed in Germany, for preserving barm, so as to be fit for all domestic uses, after a considerable time, we have inserted it for the benefit of our country-readers: When the yeast is taken from new beer, it must be put into a clean linen bag, and be laid in a vessel half full of dry, sifted wood-ashes: the whole is then to be covered to the thickness of three or four inches with similar ashes, and be pressed together. In this situation, the barm should remain for a day, or longer, if it be necessary; when the ashes will absorb all the moisture, and the yeast acquire the consistence of a thick paste. It must now be formed into small lumps, or balls; dried in a moderate heat; and kept in bags, in an airy, dry place: when any barm is wanted, a few of such balls may be dissolved in warm water; or, which is preferable, in beer; and they will answer every purpose of fermentation.

Besides its utility in baking and brewing, late experiments have fully proved, that *yeast* is of singular efficacy in *putrid fevers*, putrid sore throats, and similar malignant complaints: for the first discovery of this important fact, we are indebted to the Rev. Edmund Cartwright. The dose of barm, according to his experience, and that of other practitioners, is two large spoonfuls, to be repeated every three hours: in some cases, this has been sufficient; but, in others, it was necessary to administer the Peruvian bark, between each dose. In a few instances, indeed, emetics and laxatives were given previously to taking the yeast; but, in general, this simple remedy seldom failed to effect a cure; provided due attention was bestowed on the diet and regimen of the patient.

YELLOW, is one of the seven primitive colours.

The principal article affording a yellow dye, is the Weld, or DYER'S GREEN-WEED; of the culture of which, the reader will find an account in that article.

An excellent yellow dye may likewise be prepared from the flowers of the *acacia*. These must be gathered, before they be fully blown, and dried in an earthen vessel over a moderate fire, till they crisp, or curl up, in the same manner as tea-leaves. The ripe seeds of the same tree are then added in the necessary proportions; and the whole, when boiled in river-water, with the addition of alum, will impart a yellow colour of any shade required.

[The United States have several fine native yellow vegetable dyes, among which the *Hydrastis Canadensis*, *Quercus tinctoria*, (Black-oak,) and *Xanthorhiza*, deserve to be particularly mentioned. See those articles.]

In the 61st vol. of the "*Philosophical Transactions of the Royal Society*," for 1771, the following receipt for preparing a beautiful yellow dye, is communicated by Mr. PETER WOULFE: Take half an ounce of pulverized indigo, and mix it in a deep glass vessel, with 2 oz. of strong spirit of nitre, previously diluted with 8 oz. of water, to prevent the indigo from taking fire. Let this mixture stand for a week, and then digest it in a sand heat, for one or two hours; adding 4 oz. of water. The solution is now to be filtered: when mixed with water, in the proportion of one part of the former to four or five of the latter; and, on adding a little alum, it communicates a durable yellow colour. Mr. WOULFE remarks, that none of the tinging matter separates from the water, during the operation of dyeing, except the portion adhering to the cloth; so that this preparation promises to be of essential service to dyers. He farther states, that cochineal, cudbear, or orchal, and similar colouring substances, when treated in this manner, will also impart a yellow tinge to silk and wool.

The chief *yellows* used in *painting*, are Dutch pink, Turbith-mineral, King's and Naples yellow: of these we have given a concise account; see COLOURS; but, as the preparation of the two last-mentioned pigments has not been accurately stated; we shall subjoin, by way of supplement, a few hints respecting the manner in which they are compounded, for the use of artists.

King's-yellow:....Mix 20 parts of pulverized arsenic with one part of the flowers of sulphur: let them be sublimed in a proper vessel, in a sand-heat. When the sublimation is effected, the colour will be found in the upper part of the glass, whence it must be carefully removed, and levigated till it become a fine powder....This pigment may also be obtained, by subliming orpiment in a similar manner; and it may be rendered of a deeper or lighter colour, by increasing or diminishing the proportion of sulphur.

Naples yellow is prepared by levigating, on a dry stone, 12 oz. of white lead: 3 oz. of antimony; 1 oz. of alum; and a similar quantity of sal-ammoniac. These ingredients must now be exposed, in an open crucible, to a moderate heat for some hours; after which,

the fire ought to be increased for a short time; and, at length the mixture should continue for three hours, in a degree of heat sufficiently powerful to keep the crucible red hot. At the expiration of that term, it will acquire a beautiful yellow colour; which may be rendered of a brighter golden shade, by augmenting the proportions of antimony and sal-ammoniac.

Yellow pigments of various shades may also be obtained, by triturating flowers of sulphur, or yellow ochre, in different proportions, with a solution of gum in water: and, lastly, the calx of iron, when precipitated by quick-lime, from a solution of green vitriol, has been recommended as a substitute for yellow ochre, in *house-painting*....Another method of preparing the celebrated *Naples yellow*, is that of M. PASSERY, who makes use of the following ingredients, namely: antimony, 1 lb.; lead $1\frac{1}{2}$ lb.; alum and common salt, of each 1 oz....We have inserted this recipe, on the authority of Mr. WIEGLEB; who simply enumerates the articles here stated, without communicating the process of compounding them.

Yellow Ink may be prepared, by previously dissolving a small portion of alum and gum-arabic in pure water, and then infusing a few grains of dry saffron in the same solution....It may, likewise, be obtained by slowly boiling 2 oz. of Avignon, or French berries in one quart of water, with half an ounce of alum, till one-third of the fluid be evaporated; when 2 drams of gum-arabic, 1 dram of sugar, and a similar quantity of pulverized alum, are to be dissolved in this liquid: the mixture should then be filtered, and preserved in bottles.

Sympathetic Yellow Ink, is directed, by WIEGLEB, to be prepared in the following manner:....Take a handfull of the leaves of common marigold (*Calendula officinalis*, L.) and macerate them for eight days, or longer, in half a pint of the best distilled vinegar; when the liquid must be separated from the leaves, by expressing them through white linen or cotton, and preserved in a glass bottle carefully stopped. If the desired colour is to be of a pale shade, an additional quantity of water may be added. Invisible characters may be formed with this liquor on white substances, such as linen, silk or paper; and the yellow tint will appear on immersing them in the following liquor:...Take a sufficient quantity of violet or daisy flowers; bruise them in a marble mortar; add a small portion of water; express the liquid through white linen, and also preserve it in a glass bottle.... An infusion of turnsol will answer the same purpose.

YELLOW FEVER, is one of the most fatal epidemics to which the inhabitants of warm climates are subject.

As the opinions of physicians, concerning the nature and treatment of the *Yellow Fever*, are various and contradictory, we shall avail ourselves of the clear and satisfactory view of this malignant disease, lately given by Dr. THOMAS DANCER, in his excellent work, entitled "*The Medical Assistant, or Jamaica Practice of Physic*," (4to. Kingston, Jamaica; and Lond. Murray and Highley, p. 384. 1*l.* 1*s.* in boards), designed chiefly for the use of families and plantations." This intelligent practi-

tioner justly observes, that the misunderstanding on the subject has probably arisen from an improper use of terms, or from the variable character of the disease; according to the prevailing constitution of the season: the quantity and force of contagious matter, and other causes. He is fully convinced, that it is not regularly one and the same disorder: but is often a compound, at one time partaking of the nature of the Malignant Fever, at another resembling the Bilious Remittent. Hence, it is not uniformly contagious, and the fever of *new-comers* may not always be malignant: there are instances in which, on their first arrival, they had a common fever, which afterwards changed into the yellow fever: though the reverse of this generally occurs.

Means of Prevention: Dr. DANCER observes, that, though bleeding is precarious and hazardous after the fever has commenced, it may, nevertheless, in particular cases, where the habit is very full, &c. be considered as a mean of preservation. Young and athletic persons, therefore, may, on their first arrival, lose a few ounces of blood: their bowels should, on the same principle, be kept open; and every species of intemperance, as also exposure to the sun, and evening air, ought to be carefully avoided. It is, however, of still greater consequence to retreat, as soon as possible, from the shipping and sea-shore, the seats of infection, to a pure, airy, cool situation in the country, and there to remain for some months. Dr. D. has known many young men, who thus have avoided any dangerous fever; and some who, by returning too speedily to the towns or sea-ports, fell victims to the disease.

"The prevailing mortality among new comers (says this accurate observer), is a good deal to be attributed to their own misconduct. Coming out in convoys, they arrive in numbers; meet at taverns; and, allured by scenes of novelty, they walk the streets, indulge to excess in the use of the country fruits; and enter too readily into the customs of the seasoned inhabitants, which are not at all suited to persons in their situation."

According to the experience of Dr. CLARK, the best preventive of this destructive epidemic, is *mercury*. Hence, he advises all persons, who have sufficient leisure, to undergo one or two courses of that medicine, after their arrival in the West Indies; to take a few laxatives; to confine themselves to a moderate use of wine; and to live principally on fruits and vegetables, for the first two months: for, by pursuing such conduct, "they may rely almost to a certainty on escaping the fever."

With respect to the *characteristic symptoms* of this malignant disorder, we cannot, on comparing several authors who have written on the subject, select a better or more correct description, than the following, given by Dr. DANCER; whose words we do not hesitate to quote; especially as many of our readers, or their relations, residing in Jamaica, or other parts of the Western World, must feel greatly interested on the occasion: "This fever, then, peculiar to new-comers, attacks suddenly; with alternate fits of heat and cold; violent pain in the head and back. The face is prodigiously flushed; the eyes are

red and watery; the whole physiognomy of the patient is very peculiar, denoting anxiety and dejection of mind: and this unnatural appearance continues, till recovery begins to take place. The pulse, in the beginning, is frequent, full, and hard, sometimes irregular; the heat of the body very great; and the patient labours under great inquietude. This state of the fever continues for a longer or shorter period: sometimes only for a few hours; at others, for several days; and, when the ardent symptoms begin to decline, if not sooner, an irritation at the stomach commences, which is hardly, by any means, to be subdued, or even allayed. The patient now feels himself in other respects well; his pulse and heat being nearly natural, and he has seldom any return of fever; but the irritation and anguish at the stomach continuing, he at length vomits blackish matter; his eyes and neck first become yellow, and then the whole body. Blood flows from the mouth and nose: Delirium, preceded by a hurried perturbed state of mind, and great restlessness, at length comes on; ending in total insensibility, &c. and ultimately in death."

The yellowness of the skin, however, is not a constant symptom; for sometimes it does not appear, or at least not till after death. Dr. Dancer farther observes, that the yellow fever is particularly distinguished by its sudden attack; as it is seldom, like other fevers, preceded with any symptoms of languor, weariness, &c.; by its having no very sensible abatement or remission, till it totally subsides; by the extraordinary anguish about the fore-part of the chest, and at the same time a torpid state of the bowels; so that the strongest purgatives, and in large doses, are often attended with little or no effect.

Such are the general symptoms, attending this fever in *Jamaica;* but numerous variations often occur in *America*, and other warm climates, where it is modified by the season of the year, or other circumstances, which our limits will not permit us to detail: we shall, therefore, briefly mention the supposed origin of this malady, and exhibit an account of the treatment that ought to be adopted.

The yellow fever is certainly endemial in the West Indies: its *cause* is reputed to be a peculiar contagion, which very generally affects persons recently arrived from a cold climate, and especially Europeans, or those who have not long resided in hot countries. Females, and negroes are, in general, exempt from its influence; but *mulattoes*, and *tawnies*, or such as are descended from European and black parents, are equally subject to the fever with the whites. From the West Indies, this epidemic has been conveyed to America, where it committed dreadful ravages, in the year 1793, especially in the province of Pennsylvania: nor is any person, who has once been seized with it, secure from a second attack.

Cure: Conformably to the symptoms above stated, and drawn from actual observation, by Dr. Dancer, we shall first exhibit his mode of treatment, in the different stages of the yellow fever, as applicable to the climate of *Jamaica*. He previously remarks, that his account, though incomplete, is sufficiently full and accurate, to enable any person to distinguish that dis-

ease from any other, except the malignant fever; to which it has an obvious affinity.

Where the yellow fever attacks in the manner of a common remittent, and shews no symptoms of malignity, till after some continuance, Dr. D. observes, that the following treatment may not be deemed necessary or suitable; though, he thinks it is, on the whole, the safest plan, to consider every fever with which a new comer may be seized, as being of this kind; for, unless the method of cure suited to it, be adopted in the beginning, it cannot afterwards be employed with any probability of success.

On a supposition, that a person newly arrived in Jamaica, or any other tropical country, be suddenly attacked with violent pain of the head and back, with heat and flushing of the face, &c. in the manner before described, Dr. D. recommends, in the first place, to let the patient be put to bed, as soon as he is taken ill; then an opening clyster to be administered; and, immediately after, a dose of calomel and jalap to be taken, either in powder, mixed with syrup of tamarinds, or made into pills.... The dose must be regulated by the constitution of the patient, and the greater or less violence of the symptoms; so that from 5 to 10 grains of calomel, and from 15 to 30 grains of jalap, have been occasionally prescribed. Some time (from 2 to 3 hours) afterwards, a tea-cupful of tamarind-water, or a decoction of tamarinds with cream of tartar, should be drank; and, if stools do not freely follow, the preceding, or a smaller dose may be repeated in the course of 5 or 6 hours. If plentiful evacuations have taken place, but without any abatement of symptoms, small doses of calomel and antimonial powder should be given, in the proportion of from 5 to 10 grains of the former, to 3 or five grains of the latter; to be taken every three hours in barley-water, or thin panada. During the intervals, Dr. D. directs the following saline julep: Salt of wormwood, or salt of tartar, 2 drams, to be dissolved in half a pint of mint-tea. To every two table-spoonfuls of this solution, add one table-spoonful of strained lime-juice; which mixture is to be swallowed during its effervescence, or immediately after. In order to ascertain the exact quantity of the acid requisite to neutralize the saline draught, it should be tried first, by pouring into the latter small portions of the former, till the frothing be completed. At the same time, the mercurial frictions must be commenced; namely, two drams of the strong mercurial ointment, rubbed into the inside of the knees or thighs, every six hours, or, in some cases, every three hours; or otherwise, half an ounce every six hours. If, in 12 or 15 hours from the first attack, there be no obvious remission, in consequence of such treatment, the frictions ought to be continued every three hours; and, if the bowels have not been opened, ten grains of calomel must be given in combination with jalap; or, in the contrary case, with one quarter of a grain of opium, to prevent the calomel from acting on the bowels, if already too loose. Thin barley-water, or other diluents, may be allowed frequently, and the medicines above specified be continued, till the mouth becomes sore, and the breath affected; unless a distinct remission of the fever be per-

ceived. Should the stomach become irritable, and retchings commence, a blister must be instantly applied, either to the pit of the stomach, or between the shoulders; the vitriolic æther be administered in a little water, or in the saline julep before described.

The quantity of mercurial ointment to be used, as well as the calomel to be taken, during the whole course of this malady, is sometimes very considerable, before either the glands of the mouth are affected, or any remission of the symptoms take place. In some cases, more than 1000 grains of calomel have been given, and several ounces of mercurial ointment have been rubbed in, not only with impunity, but with evident success. In general, when the salivation commences, the fever and irritation at the stomach subside. Nevertheless, it will be necessary to continue the frictions, in a more moderate degree, to support the flow of saliva.

Although Dr. D. does not pretend that this mode of treatment is uniformly efficacious, yet, on comparing it with any other in use, it is, in his opinion, *eminently successful*, and affords the patient a double chance; because it does not hinder the employment of any other means that could be devised, if mercury were not administered.... The violence, however, with which the fever frequently attacks, leaves in many cases, but little hope from any plan or cure whatever: hence, Dr. BLANE justly observes, that there are instances, where the disease is *determinedly* fatal, or where the animal functions are, from the beginning, so deranged, that there are no possible means of restraining the morbid motions; and dissolution necessarily takes place. In more favourable circumstances, however, Dr. DANCER remarks, that the sore mouth, resulting from the use of mercury, though often very distressing, is seldom attended with any danger, or inconvenience of long duration. He quotes on this occasion, Mr. BLANE, who, in his late publication on the use of the *nitric acid*, says, that although this sometimes causes salivation, yet it is the most powerful means of allaying ptyalism, induced by mercury. Indeed, this affection of the mouth is not easily removed; but it may be greatly alleviated by the frequent use of proper gargles, such as the following directed by Dr. DANCER: Sage-tea, 1 pint; vinegar, 4 oz. and honey, 1 oz;....or, sage-tea, 1 pint; honey, 1 or 2 oz; and alum, 1 dram. The following gargarism we can recommend, from the frequent experience of its good effects in similar cases, namely: Equal parts of distilled vinegar and lime-water; adding a small portion of syrup of red roses, sufficient to sweeten the mixture.

The Peruvian bark may, occasionally, be given in the latter stages of the yellow fever, to complete the cure; but, as it is not always found to agree, Dr. DANCER concludes with saying, that "food and wine are the only things farther required."

However inconsistent to theory, or to preconceived notions, this mode of treatment may appear to others, Dr. DANCER affirms, that "*it has stood the test of experience, and ought to be adopted, till a better one has been discovered.*" Having thus fairly stated *his* practice, in this virulent disorder, he briefly recapitulates that of other physi-

cians: and, as it may be of some service to persons who reside in those tropical climates, or propose to visit them at any future period, we shall also subjoin a concise view of the various modes of treating this malady, practised by Drs. Hillary, Mosely, Rush, Clark, Blane, and Jackson.

With a view to moderate the rapid motion of the fluids, and to abate the violence of the yellow fever, during the first two days, Dr. Hillary directs blood-letting, in the proportion of from 12 to 20 oz. according to the age, strength and other circumstances attending the case of the patient. The next indication is, to evacuate putrid bile, and corrupted humours, with such expedition as maybe consistentwith safety: hence Dr. H. advises small but frequent draughts of warm water to be swallowed, with the occasional addition of a little oxymel, green tea, &c.; when a grain or a grain and an half, of crude opium is given, in order to compose the stomach after the violent retching, pain, and anxiety, necessarily occasioned by severe vomiting. And, as this organ is unable to retain either solid or fluid matters, the body should be kept open, by means of a mild purging clyster. The third indication is, to prevent the putridity of the fluids, and also the approach of gangrene, by exhibiting proper antiseptics....For such purpose, Dr. H. prescribes a slight infusion of the Virginian Snake-root; as it braces the stomach, and enables it to bear the Peruvian bark.....A more particular account of Dr. Hillary's treatment, may be found in his "*Observations on the Air and Diseases of Barbadoes.*"

Dr. Mosely recommends repeated bleeding in the first stage, and continued purging with vitriolated tartar.

Dr. Rush bleeds copiously and repeatedly; gives purgatives composed of calomel and jalap; then continues the calomel alone, till it affects the mouth. He conceives, that as the symptoms of the yellow fever are extremely violent, and its progress is uncommonly rapid, the most efficacious remedies ought to be employed, as early as possible. Hence *venesection* should, in his opinion, not be deferred beyond the first day; for it is of peculiar service to persons of robust and plethoric habits, especially such as have recently arrived from Europe. And, though this operation may not be performed sufficiently early to save life, yet it contributes greatly to relieve the sufferings of the patient. Farther, it will be advisable to take some blood, every day, while the fever continues: the quantity to be drawn depends on the state of the pulse. The blood appears thick and sizy; and, it is a remarkable fact, that patients of every age can support the loss of that fluid, much better in the yellow, than in any other inflammatory fever. After venesection, purgatives are administered: with this intention, small doses of calomel, consisting of 2 or 3 grains, taken every hour; or, of 5 grains, combined with half a grain of opium; or, of 10 grains of calomel mixed with 15 grains of jalap; to be swallowed every 5 or 6 hours, have been prescribed by Drs. Rush, Clark, and other practitioners, with the best effect. Instances have occurred, in which patients have taken from 100 to 230 grains of calomel, within three or four days; in all of whom the violence

of the disease abated, immediately after salivation commenced. ......Blisters, applied to the legs and thighs, have likewise proved very useful.

According to Dr. Jackson, great benefit has been derived from the affusion of cold water on the body of the patient, after having lost 20 or more ounces of blood. But, as this remedy has in some cases produced contrary effects, from being injudiciously employed, Dr. Blane proposes the application of cloths soaked either in cold water, or in a mixture of that fluid and of vinegar: by such treatment, patients have been recovered, whose cases were apparently desperate.

As vomiting is the most distressing symtom in the yellow fever, various remedies have been proposed, with a view to check it, and to dispose the stomach for the reception of the Peruvian bark, or other tonics and antiseptics. With this intention, the saline draughts above mentioned, when in a state of effervescence, have been advantageously swallowed. Similar effects have resulted from the use of acid juices, such as those of oranges, and lemons, combined with wine, hot water, sugar, and nutmeg; then succeeded by frequent doses of magnesia and mint-water....M. Desportes affirms, that milk, boiled with a little flour or bread, and given repeatedly, in the quantity of one spoonful, operated more powerfully than any other remedy, for stopping billious vomiting. Dr. Blane, however, states, that this symptom was relieved by fomenting the stomach with *stupes*, or cloths, dipped in a decoction of bark, and sprinkled with camphorated spirit, or with the tincture of bark. But the most efficacious means, which he prescribed for checking such symptom, was that of blisters laid on the stomach: these were attended with the greatest success; and his practice has been justly recommended by Drs. Clark, and Maclean.

When the irritation of the stomach has subsided. Peruvian bark may be administered; and, if such drug disagree, it may be given in the form of a clyster.... Farther, it may perhaps be of some service to try the *essence of spruce;* as that vegetable preparation has been retained on the stomach, when every other remedy was discharged by the mouth: it must be diluted with hot water, in the proportion of 3 oz. to one quart; and half a pint of the solution should be swallowed every two hours.

Lastly in the more advanced stages, camphor combined with opium, may be given with advantage, particularly in the evening; as perspiration and sleep will thus probably be procured, and consequently the patient will be greatly relieved.

During the continuance of the yellow fever, few patients are able to take any food: they ought, therefore, to be kept as quiet as possible; and should endeavour to dispel all intense thought or care; for anxiety cannot fail to aggravate the violence of the disorder.

Those of our readers, who wish to acquire more extensive information respecting this terrible scourge, in all its various modifications, will meet with complete statements in Dr. Clark's "*Treatise on the Yellow Fever, as it appeared in the Isle of Dominica,*"&c. 8vo. Murray and Highley, 3*s.* 6*d.* ;....in Dr. Jackson's "*Outline of the History and Cure of Fever,*" &c. 8vo.

5s. ;....in Dr. RUSH's "*Account of the Bilious Remitting Fever, as it appeared in the City of Philadelphia, in the year* 1793," 8vo. Mawman 6s. ;....in Dr. MACLEAN's, "*Inquiry into the Nature and Causes of the great Mortality among the Troops at St. Domingo*," 1797, 8vo. 7s. ;.....and in Dr. BLANE's valuable "*Observations on the Diseases of Seamen*," 3d edit. 8vo. 1799, 7s. Murray and Highley.

YELLOW-HAMMER, or *Emberiza citrinella*, L. is a well known diminutive bird, which inhabits Britain, and other parts of Europe: according to Mr. PENNANT, its bill is of a dusky hue; the crown of the head, and the belly, are of a pale yellow, or straw-colour; the hinder part of the neck is tinged with green; and the breast is of an orange-red.

Yellow-hammers frequent meadows, where they construct their large flat nests of dried moss, roots, and horse-hair; and the female lays six white eggs, streaked with purple veins.....These birds are of considerable service to the husbandman, by devouring innumerable insects during the summer; but, in winter, they resort for sustenance to farm-yards, in common with sparrows and other birds.

YELLOW - RATTLE, COXCOMB, or PENNY-GRASS, *Rhinanthus Crista-galli*, L. a native plant, growing in meadows, pastures, and woods; blowing in the months of June and July.....This vegetable sometimes overspreads whole meadows with its yellow flowers: in a green state it is eagerly eaten by cattle; but, when dry, it forms a hard and tough fodder. Hence, careful farmers cut off the flowers, before the seed attains to maturity, in order to prevent its propagation.

YELLOWS, or JAUNDICE, in farriery, is a disorder to which horses are occasionally subject: it is known by the dusky-yellow appearance of the eyes, the inside of the mouth, and of the lips. The animal looses all his vigour, and refuses to take any food; a slow fever prevails, which increases, together with the yellowness, according to the malignancy of the disease. His dung is hard, dry, and of a pale yellow or green cast: the urine is of a dark-brown colour; and is discharged with great pain and difficulty: after it has lain for some time on the pavement of the stable, it acquires a bloody hue. In a short time, if the horse be neglected, he becomes delirious and frantic.

When aged animals are thus attacked, there is little prospect of recovery; but, if the distemper be recent, and the horse young, it will be advisable to adopt the treatment already pointed out, vol. iii. p. 351. Should no relief be obtained in the course of two or three days, the animal must be bled copiously; and the following laxative clyster, be injected: Let two handfuls of marsh-mallows: one handful of chamomile flowers; and one ounce of fennel-seed, be boiled in three quarts of water, till one-third be evaporated: the liquor must then be strained, and incorporated with 4 oz. of treacle, and a pint of linseed, or any common oil.

After such clyster has been injected, it will be necessary to administer two or three purges, each consisting of $1\frac{1}{2}$ oz. of pulverized Indian rhubarb; 2 drams of saffron; and 6 drams of socotrine aloes,

mixed with syrup of buckthorn; which ought to be given once in 48 hours: on the intermediate days, the following balls and drink should be introduced between each dose: Take half an ounce of Æthiops mineral; a similar quantity of millepedes; and 1 oz. of Castile soap: let them be formed into a ball, and washed down with a decoction made of 4 oz. of madder-root; the same weight of turmeric; half a pound of the sliced roots of burdock; 4 oz. of Monk's rhubarb; and 2 ounces of sliced liquorice: these ingredients must be boiled in one gallon of *forge-water*, till one quart be evaporated; when the liquor should be strained, and sweetened with honey.

By this treatment, the violence of the disease will generally abate in the course of a week, or ten days; a change which may be ascertained by the eyes and mouth losing part of their yellow cast; though it will be advisable to continue the medicine above directed, till such colour totally disappear: when the animal is in a state of recovery, a few purges should be given, and he ought to be moderately exercised, in order to recruit his exhausted strength.

[The yellows, or *yellow-water* as the complaint is most generally called, has prevailed with great mortality in Pennsylvania and N. Jersey, within the last 15 years, among horses.

The symptoms, in addition to those mentioned above, are as follow. "The tail is occasionally projected horizontally and dropped in an unusual manner, frequent and ineffectual attempts are made to dung: the flanks are hollow, partial chills take place, and the hind legs are stiff and straddle wide; finally, all the limbs failing, the horse falls to the ground and writhes in agony.

"On dissection, the liver is found schirrous, dry, and may be even rubbed to pieces. In one case it was reduced to one-fourth its original size."

Richard Peters, Esq. to whom the Editor is indebted for the above remarks, thinks that horses feeding in open pastures, in warm weather, exposed to the chilling damps of night, are most subject to this disorder; and therefore advises that they be permitted to sleep under a shed. He has known a horse affected with the disease, that had pastured in a field for a long time alone, and had no communication with any other horse. He also knew two or three horses that died with the disease in stables containing 30 or 40 horses, without spreading the disease.

The remedies which Mr. Peters successfully used, when the disease appeared among his horses in 1799, were: 1. *copious* bleeding, viz. a gallon of blood the first day, and half a gallon every day for three or four days. 2. Frequent doses of the following prescription, two drams of *calomel*, joined to two oz. of aloes. 3. Large doses of nitre. 4. Roweling and blistering, and the free use of mercurial ointment about the neck, mouth and cheeks. He observed the salivation to appear, about the period that the blister drew, and from that hour the animal exhibited signs of recovery. He also used clysters of a decoction of black snake root (*actea racemosa*) and peach-leaves, to which some salt and molasses were added..... If the clysters are rejected he di-

rects the gut to be scraped, to promote the evacuation of hardened dung, cleanliness, good nursing, hard rubbing; to clothe the horse and to keep him from the night air. Every thing in his opinion depends upon early attacking the disease; for after a certain time, which occurs probably in the first 24, or at furthest 48 hours, nothing will cure; and as 12 and often 24 hours are required for the operation of any purgative, it should be given on the first attack. The above treatment was pursued by a gentleman on the recommendation of Mr. PETERS, and with success.

In the *Medical Repository* of New York, vol. 3. Dr. SAYRE, describes the Yellow Water as it prevailed in New Jersey. He also used frequent and copious bleeding, and large doses of calomel and jalap, with success.]

YELLOWS, a disorder affecting black cattle, which, if it be not timely attended to, will induce the MURRAIN, and other fatal distempers.

Symptoms:....Every morning, a general tremor over the animal, particularly in the hinder legs, loins, and thighs; the eye-lids appear hollow; the whole body assumes a yellow cast; the nose is dry; and, if the creature have taken a severe cold, the ears hang down; the dewlap, shoulders, and loins swell; the udder of cows become tumefied, and produce little milk; which, in a few days, acquires a peculiarly yellow tinge, coagulating when boiled; and, lastly, the fore-teeth become so loose as to be in danger of dropping out. It will be necessary to observe these symptoms with accuracy, and particularly that first mentioned; because, if they remain unnoticed for a few days, the disease will settle on some of the interior parts, and be followed by uncommon weakness, wheezing, dropsy, or other fatal distemper.

This malady is conjectured to proceed from the folds, in the inner membrane of the neck of the gall-bladder, becoming too weak to perform their functions; so that the bile, instead of being conveyed into the intestines, preternaturally forces itself into the biliary ducts, whence it passes through the *vena porta*, and mixes again with the blood: hence, that fluid acquires a corrosive quality, becomes thick or sizy, and consequently circulates slowly throughout the system.... From such disorganization, the livers of the diseased animals are incapacitated from performing their functions, so that the supply of bile is inadequate to the quantity thus unnaturally expended; and the blood concretes in different parts of the body, forming painful tumors, both internally and externally. This distemper is most to be apprehended, for about five weeks, in the commencement of the spring and autumn, when the days are warm, and the evenings cold: in those seasons, the grass being very rich and succulent, the animals are apt to eat too freely.

The following remedies have been recommended, as being peculiarly efficacious in removing the *yellows*. First, take a handful of the tops of rue, and a similar portion of the greater celandine: let them be cut into small pieces, mixed with 1 oz. of pulverized turmeric (or, if this cannot be procured, of red Saunders-wood), and boiled in three pints of stale beer

or ale. When the liquor is lukewarm, it must be given to the animal, and the dose repeated at the expiration of two days. Should a diarrhœa or *scowering* take place, the following preparation may be administered in the interval: Let 2 lbs. of oak-bark be boiled in one gallon of water, till one-fourth part be evaporated: it is then to be strained, and 2 lbs. of rice should be boiled in such liquor, till it be soft: half a pound of burnt crust of bread, taken from the lower part of a loaf, and 2 quarts of milk, are next to be added; and the whole is suffered to simmer for about 20 minutes, when it should be divided into two portions, and given in a warm state to the animal. By this treatment, cattle may be recovered in the course of a few days; provided they have not been too long neglected: for, when the disease has gained ground, such remedies ought to be continued for an additional length of time.

YELLOW-WEED. See DYER's-WEED.

YEW-TREE, the COMMON, or *Taxus baccata*, L. a native of Britain, and other parts of Europe, as well as of America: it grows in mountainous woods, hedges, and rocky soils; producing its flowers in March or April, which are succeeded by bright-red, soft, oblong berries, containing a mucilaginous white juice, and arriving at perfection in September.

The yew-tree thrives most luxuriantly in a moist, loamy soil: it may be propagated by sowing the ripe berries in autumn, in a shady bed of fresh earth, and covering them to the depth of half an inch with similar mould: when the young plants appear, they ought to be carefully weeded, and occasionally watered in dry seasons.... In this situation, they must remain for two years; after which they ought to be removed, in the month of October, into beds of unmanured soil, at the distance of 6 inches from each other, and in rows one foot asunder; being gently watered till they have taken root. Here the plants should again continue for two years; at the expiration of which, they must be transplanted, in autumn, into a nursery, and placed 18 inches from each other, in rows three feet apart. When the young trees have stood three or four years in the nursery; it will be advisable to set them, in September, or October, in dry ground; and, at length, in the subsequent spring, to place them in cold, moist situations, where they are designed to remain. The period of their growth is computed at 100 years; and their duration in the ground, at four centuries.

Formerly, the yew-tree was cultivated in Britain, chiefly for the manufacture of *bows*; but, since these implements of war have been superseded by fire-arms, it is generally raised as an ornament to parks and plantations, on account of its ever-green leaves. This useful tree admits of being frequently pruned; and may be made to assume any particular figure: hence the gardens of our forefathers were filled with ships, birds, quadrupeds, men, and other vegetable monsters. But such absurd fancies are gradually disappearing; a more natural system of horticulture is making rapid progress; and the yew is at present advantageously planted in hedges, as a fence for orchards and shrubberies, against severe winds.

The wood of this tree is hard and

smooth; beautifully veined with red streaks; admits of a fine polish; and is almost incorruptible: hence it is advantageously employed by turners and cabinet-makers, for manufacturing spoons, cups, as well as tables, chairs, and various other articles. It is also usefully converted into cogs for mill-wheels, axle-trees, flood-gates for fish-ponds; and may perhaps be effectually substituted for *box;* so that considerable sums of money might be annually saved, which are now exported to the Levant, in order to supply engravers, and other artists, with that wood.

The red berries of the yew-tree have a sweetish taste, and abound with mucilage: they are not only devoured by hogs and birds, without any pernicious effects resulting from them, but are also frequently eaten with impunity by children; though, in some persons, this fruit is apt to produce noxious effects, especially if the stones be swallowed. We are nevertheless, persuaded, that a very copious and strong spirit may be easily extracted from these berries, by distillation; and that their conversion to this purpose might annually save many thousand bushels of grain, which are unnecessarily wasted in the *still*, while the abundant vegetable productions of the woods, hedges, and commons, are suffered to decay, or are heedlessly left to become a prey to wild birds, and other animals. See also SPIRITS, p. 26.

The leaves of the yew-tree are reputed to be poisonous to the human species, as well as to cattle of every description. Attempts, however, have lately been made, to employ them for feeding *horses*, in times of scarcity; and, if our account be accurate, we have read in some recent publication, that such leaves were given to those animals with perfect safety, when cut together with hay or straw, so as to use, at first, only the tenth or twentieth part of this foliage, and *gradually* to increase the proportion of the latter, and to reduce that of the former, to one-half, or even a smaller quantity. Thus, it appears to be perfectly consistent with reason and analogy, that the oily and astringent principle of the yew-tree leaves may be corrected, by sheathing it with a large portion of balsamic hay, and absorbent straw; yet we cannot, on this occasion, speak from positive experience. According to agricultural writers, the *loppings* and *bark* of this tree are equally pernicious to cattle, especially when in a half-dried state; several sprigs having been found in the stomachs of dead animals, entire or undigested. It is, however, an erroneous supposition, which still prevails in some country places, that the very shade of its foliage is hurtful to animal life.

On the other hand, BECHSTEIN informs us, that the wood of the yew-teee, when reduced to powder by a file, mixed with paste, and baked in an oven, has been highly extolled in Germany, as a sovereign remedy for the bite of a mad dog: it is, therefore, taken in doses of half an ounce.

DAMBOURNEY observes, that a decoction of yew-tree berries imparts a handsome *chamois* dye to wool previously immersed in a weak solution of bismuth....On boiling the red root of this tree, together with the bark of the common birch-tree, he obtained a beautiful cinnamon colour, with

a *mordore* tint; but the wool was first boiled for a considerable time in a solution of tin: and, by adding alum, the dye assumed an *aurora*, or bright-red colour.

YOKE, in agriculture, is a wooden frame, adapted to the necks of oxen, by means of which they are coupled and fastened to the plough, or other vehicle. It is composed, 1. of a thick piece of wood, that passes over the neck, and is strictly called the *yoke*, 2. of a *bow*, which encompasses the neck, and 3. of the *wreathings*, or *stitchings*, that serve to connect the whole. Beside these parts, there are employed, a ring, denominated the *yoke-ring*; and a chain, for securing the traces.

The yokes chiefly used in England, are those known under the name of the *Roman Ox-yokes*, which are preferable to the cumbersome frames formerly employed: because the animals thus acquire a greater power of draught. As, however, the Roman yokes are apt to chafe the necks, and the oxen are compelled to draw with their noses close to the ground, we conceive the *Portuguese* and *French* methods of working oxen to be the most effectual; and, having already given an account of them, we refer the reader to the article OXEN.

YOLK. See EGG.

YOUTH, or ADOLESCENCE, in general, is that happy period of human life, which commences from childhood; continues as long as the fibres increase in dimensions or firmness; and terminates at full growth: among the Romans, it was computed from the age of 12 to 25, in males, and to 21, in females. In modern times, the term adolescence, includes the age of from 15 to 25 years, and sometimes to 30.

During this important stage of our existence, the principal revolutions take place, both with respect to mind and body. While the latter progressively acquires muscular energy, and adopts a more solid deportment, the faculties of the former begin to unfold; and the young member enters into society, with all the advantages which arise from the tender regard, interest, and indulgence, evinced by the generality of mankind, towards inexperienced youth.

As it would be incompatible with our limited plan, to enter into a disquisition respecting *all* the mental and bodily imperfections, and diseases, incident to young persons of either sex; or to analyze the changes taking place during the transition from the period of childhood to that of puberty, we shall here discuss only *the dangerous influence of the power of imagination, on the juvenile character.*

None of the mental faculties exhibit such interesting and diversified phenomena, as that of IMAGINATION. While this powerful agent is restrained within due limits, it often supplies the place of a benevolent guide, through the intricate meanders of life, where we frequently meet with more appearance than reality; and in which it is of the utmost importance to be impressed with a due and lively sense of the good and the beautiful, as well as of virtue and truth. On the contrary, no sooner are the boundaries of the *imagining faculty* transgressed, than we are involuntarily led to submit to this dreadful tyrant, who is capable not only of

disturbing our repose and happiness, but even to deprive his victims of life. Hence, it should be one of the most necessary maxims of intellectual nature, always to guard against this formidable power; and to regulate its reciprocal influence; so that we may maintain a certain superiority. But in order to evince the essential necessity of adopting this rule of practical life, and at the same time to demonstrate the danger attending the neglect of it, especially to *youth*, we shall quote an instance related by Prof. HUFELAND, in one of his admired *Popular Essays*, in German; of which no translation has yet appeared.

A student at Jena, about sixteen years of age, having a weak and irritable nervous frame, but in other respects healthy, left his apartments during twilight, and suddenly returned, with a pale, dismal countenance; assuring his companion that he was doomed to die in 36 hours, or at 9 o'clock in the morning of the second day. This sudden change of a cheerful young mind naturally alarmed his friend; but no explanation was given of its cause. Every attempt at ridiculing this whimsical notion was fruitless; and he persisted in affirming that his death was certain and inevitable. A numerous circle of his fellow-students soon assembled with a view to dispel those gloomy ideas, and to convince him of his folly, by arguments, satire, and mirth. He remained, however, unshaken in his strange conviction; being apparently inanimate in their company, and expressing his indignation at the frolics and witticisms applied to his peculiar situation. Nevertheless, it was conjectured that a calm repose during the night would produce a more favourable change in his fancy; but sleep was banished, and the approaching dissolution engrossed his attention during the nocturnal hours. Early next morning, he sent for Prof. HUFELAND, who found him employed in making arrangements for his burial; taking an affectionate leave of his friends; and on the point of concluding a letter to his father; in which he announced the fatal catastrophe that was speedily to happen. After examining his condition of mind and body, the Professor could discover no remarkble deviation from his usual state of health, excepting a small contracted pulse, a pale countenance, dull or drowsy eyes, and cold extremities: these symptoms, however, sufficiently indicated a general spasmodic action of the nervous system, which also exerted its influence over the mental faculties. The most serious reasoning on the subject, and all the philosophical and medical eloquence of Dr. HUFELAND, had not the desired effect; and, though the student admitted that there might be no ostensible cause of death discoverable, yet this very circumstance was peculiar to his case; and such was the inexorable destiny of his fate, that he must die next morning, without any visible morbid symptoms. In this dilemma, Dr. H. proposed to treat him as a patient. Politeness induced the latter to accept of such offer; but he assured the physician, that medicines would not operate. As no time was to be lost, there being only 24 hours left for his life, Dr. H. deemed proper to direct such remedies as prove powerful excitants; in order to rouse the vital

energy of his pupil, and to relieve him from his captivated fancy..... Hence he prescribed a strong emetic and purgative; ordered blisters to be applied to both calves and at the same time stimulating clysters to be administered. Quietly submitting to the Doctor's treatment, he observed, that his body being already half a corpse, all means of recovering it would be vain. Indeed, Dr. H. was not a little surprised, on repeating his visit in the evening, to learn that the emetic had not, or but very little, operated; and that the blisters had not even reddened the skin. Now the case became more serious; and the supposed victim of death began to triumph over the incredulity of the Professor, and his friends. Thus circumstanced, Dr. H. perceived, how deeply and destructively that mental spasm must have acted on the body, to produce a degree of insensibility from which the worst consequences might be apprehended....All the inquiries into the origin of this singular belief, had hitherto been unsuccessful. Now only, he disclosed the secret to one of his intimate friends, namely, that on the preceding evening he had met with a white figure in his passage, which nodded to him; and, in the same moment, he heard a voice exclaiming: "the day after to-morrow, at nine o'clock in the morning, thou shalt die." He continued to settle his domestic affairs; made his will; minutely appointed his funeral; and even desired his friends to send for a clergyman; which request, however, was counteracted. Night appeared, and he began to compute the hours he had to live, till the ominous next morning: his anxiety evidently increased with the striking of every clock within hearing. Dr. H. was not without apprehension, when he recollected instances in which mere imagination had produced melancholy effects. But, as every thing depended on procrastinating, or retarding that hour in which the event was predicted; and on appeasing the tempest of a perturbed imagination, till reason had again obtained the ascendency, he resolved upon the following happy expedient: Having a complaisant patient, who refused not to take the remedies prescribed for him (because he seemed conscious of the superior agency of his mind over that of his body), Dr. H. had recourse to *laudanum*, combined with the extract of *hen-bane:* 20 drops of the former, and two grains of the latter, were given to the youth, with such effect, that he fell into a profound sleep, from which he did not awake till eleven o'clock on the next morning. Thus, the prognosticated fatal hour elapsed; and his friends waiting to welcome the bashful patient, who had agreeably disappointed them, turned the whole affair into ridicule. The first question, however, after recovering from his artificial sleep, was the hour of the morning: but, on being informed, that his presages had not been verified by experience, he assured the company, that all these transactions appeared to him not unlike a dream; and he could not conceive how he had been subject to such folly. Since that period, he has enjoyed a perfect state of health, and has been completely cured of his fancy.

There are, nevertheless, several instances recorded, in which persons have truly predicted the day

and hour of their death. In the 17th century, it was a fashionable practice among the higher classes, to apply to an *astrologer*, for learning the accurate duration of their lives. Such aberration from the human intellect, could be ascribed only to an absurd or defective system of education; when youth were not taught to discriminate between natural causes and effects; or, when parents granted every species of indulgence, which alike excited their sensual desires, and pleased a wild, disordered imagination. Many, indeed, are the gradations, in which that peculiar morbid sensation, generally termed *irregular fancy*, displays itself under different forms, even in modern times. It cannot be denied, that the numerous phenomena of *nervous* disorders, especially the diversified symptoms displayed by hypochondriacal and hysterical persons, doubtless originate chiefly from the same source. We often smile at such complaints as are supposed to arise from a diseased mind, but certainly not with justice. In short, there is no disorder more to be dreaded, and none has a more solid foundation, than that in which the sensations of our material nature, and the ideas of our very existence, are in a manner *unhinged*: nay, it is incomparably more easy to sustain a *real* evil, than to be tormented by an *imaginary* one, the force and extent of which cannot be ascertained.

YOUTH-WORT. See SUNDEW the Round-leaved.

Z.

ZAFFRE, is the oxyd or calx of cobalt, employed for imparting a blue colour to porcelain and pottery ware: it is prepared, according to CRONSTEDT, in the following manner.

When the cobalt is dug out of the mine, it is first broken into small pieces, and all heterogeneous matters are carefully separated..... The mineral is then submitted to the action of stamping mills, in which it is reduced to a fine powder, that is sifted through brass wire sieves. Next, the lighter particles are carried off by water, and the cobalt is put into a reverberatory furnace, terminating in a long horizontal gallery; through which the arsenic, usually mixed with the mineral, sublimes: farther, the cobalt is frequently stirred with long iron hooks or rakes, till it ceases to emit any fumes; when

it remains in the form of a dark grey calx, denominated *Zaffre*.

Considerable quantities of this oxyd, are manufactured from the cobalt dug out of the mines in the Mendip-hills, and also in Cornwall; beside which, there are large supplies annually imported from Saxony: such zaffre, however, is seldom pure; being mixed with a considerable proportion of pulverized flints.

The blue of zaffre is the most permanent of the different colours employed in glass-works; as it resists, unchanged, the most intense heat: hence, it is also advantageously used for giving various shades of blue to enamels, and to the crystal glasses that are made in imitation of lapis lazuli, turquoise, sapphire, and other precious stones.

ZEDOARY, or *Kæmpferia*, L. a genus of exotic plants, consisting of two species; namely: 1. The *galanga*, Common Galangal, or Long Zedoary; which has long, thick, tuberous roots, and produces single white flowers, with purple bases; and, 2. The *rotunda*, or Round Zedoary, has thick, round roots, presenting whitish flowers, that are frequently tinged with green, yellow, red, and purple..... Both species are natives of Siam: they may be raised in hot-houses, by dividing the roots in the spring, and planting them in pots of rich, light mould, where they should be copiously watered during the summer, but less frequently in the winter.

The roots of the Zedoary are imported in oblong pieces, about the thickness of a finger; or in round masses, generally one inch in diameter; paying a duty of 6½d. per lb. They possess an agreeable fragrance, but a bitterish aromatic taste; both of which may be imparted to water.

The Zedoary is a warm stomachic, and has been recommended in dyspeptic cases, for relieving flatulency, and invigorating the nervous system. Such root may be advantageously used by artisans, as an excellent yellow colour: and it may likewise be employed in painting with water colours. For this purpose, it is prepared in the following manner: Boil 1 oz. of the root in a quart of water, till the fluid have sufficiently imbibed the colouring matter, for communicating a yellow tinge to paper: it is then to be filtered through a linen cloth. The decoction may be evaporated or dried in shells; after which, it may again be diluted, and will easily spread with the pencil.

ZINC, or Spelter, is a semi-metal, naturally obtained in a state of combination with different minerals, in England, Hungary, and other parts of the globe: it is of a whitish colour, nearly resembling that of lead, though it does not so speedily tarnish.

Zinc melts a short time before ignition; but, when heated to redness in the open air, it is liable to combustion, and burns with a dazzling blaze: so that a loose white oxyd is precipitated, which is known under the name of *flowers of zinc*.

This crude semi-metal is of great utility in the arts. Combined with gold, in equal portions, it forms a hard, white compound, that admits of a fine polish, and may be advantageously manufactured into *specula*, for optical instruments.

Zinc and tin, melted together, produce a kind of pewter; and, as the former spreads more uniformly,

while it is much harder, and less fusible than tin, it has been proposed as a substitute for the latter, in tinning copper-vessels.

Spelter and copper readily unite in the fire; provided the combustion of the former be carefully prevented during the process: in this state, it forms a metal, distinguished by the general name of *yellow copper;* but which is divided into several sorts, according to the respective proportions contained in the alloy. Thus, three parts of copper and one of zinc, constitute BRASS: five or six of the former, and one of the latter, afford PINCHBECK.....*Tombac* is composed of a still larger proportion of copper to that of zinc: it is of a deeper red than pinchbeck, and bears the name of its inventor. *Prince's Metal* consists of a larger proportion of zinc than either of the preceding compositions.....*Similor*, or *Manheim gold*, resembles pinchbeck: it is manufactured into spurious leaf-gold, laces, and similar shewy articles.

Zinc is dissolved in all acids; though the sulphuric is most frequently employed: and, in the proportions stated, p. 227, of the present volume, it forms white VITRIOL.

An useful substitute for *white-lead*, in painting houses, has lately been discovered in *zinc*, by M. de MORVEAU. He directs this mineral to be calcined in a crucible, placed horizontally in the cavity usually made for retorts, in reverberatory furnaces. The oxyd thus obtained, is then to be washed in water, with a view to separate such particles as may not have been perfectly calcined; and, when it is reduced to powder, a small portion of earth of alum, or chalk, must be added; in order to give it a body. When this pigment is to be used, it will be necessary to form the powder into a heap, leaving a small hole in the middle, into which oil must be gradually poured, till it be reduced to a proper consistence; when the paint should be laid on, with a soft brush. The whitest drying oil must be procured, such as that obtained from poppies, if a white paint be designed; because coloured oil imparts a tinge that impairs its whiteness; but, if a yellowish or other shade be intended, and drying oil will answer the purpose. M. MORVEAU observes, that such paint is perfectly harmless, emitting no hurtful effluvia; and though it does not dry so speedily as that prepared of white-lead, yet it is not only more wholesome, but also eventually cheaper; as a smaller portion of zinc will be required.

In March, 1796, a patent was granted to Mr. JOHN ATKINSON, for his invention of a white paint, prepared from zinc, which may serve as a substitute for that of white-lead. He directs the former mineral to be first submitted to a reverberatory furnace, for six hours; in order to disperse all the ferruginous particles which it may contain. Next, the zinc is to be reduced to powder, by the action of a mill, and mixed with one-eighth part of pulverized charcoal, by weight; after which it must be removed to a *close* or *muffled furnace*, provided with two apertures, one on each side, "and (as the patentee expresses himself), dilated at the end from the furnace, by a distance of about 20 feet;" the other end joining the body of the furnace: such apertures should

each be furnished with a door at the farthest extremity, and which ought to be sufficiently large to admit a man to enter, for the purpose of collecting the colour. Thus the zinc must be introduced into the furnace, through the top or upper part: when it becomes red hot throughout, a large dense, white cloud, with a bright blue flame, will pass into the receptacles or apertures above-mentioned, where it will collect in the form of a pure, white metallic calx.

The ozyd of zinc is now to be diluted with water, and ground or triturated in a proper mill: from this machine it is conducted, by means of gutters or spouts into fine sieves, whence it passes into several cisterns full of water, communicating with each other by similar gutters; so that the finest particles float into the farthest reservoirs. After standing about 24 hours, the water may be drawn off, and the colour collected into pans, receivers, or other vessels, capable of bearing heat, in which they are dried; and in this state, the paint will be ready for sale; but previously to its application, it ought to be properly levigated.

According to M. RINMAN, a fine *green* colour for painters may be procured from the oxydes of cobalt and zinc. He directs any portion of cobalt-ore to be dissolved in the nitro-muriatic acid (AQUA REGIA), and to be mixed with half that quantity of nitrat of zinc: a lixivium of pot-ash is then to be added; and when the precipitate is ignited to whiteness, it will be fit for use.

Beside its utility in the arts, *zinc* is of considerable service in medicine. Its *flowers* are advantageously employed as an antispasmodic, particularly in epilepsy, and in the acute spasms of the stomach, to which persons of delicate constitutions are subject: they have also been given with success in some cases of dry asthma. The dose is from one to two grains, taken twice in the day, and gradually increased to 8 or 10 grains; but, being a very powerful remedy, it ought never to be resorted to, without medical advice.

For an account of the affections in which the *vitriol* of *zinc* may be of service, the reader will consult the article VITRIOL.

ZIZANY, the WATER, or *Zizania aquatica*, L. is a native of North America, where it grows in wet and marshy situations....The root of this vegetable is fibrous, and strikes forth many angular, smooth stalks of a serpentine form. The panicle on the central stalk is generally four feet long, while those on the others never exceed twelve inches. The large, oval, yellowish, mealy seed attains to maturity in September, and has the agreeable taste of rice; on which account it is much esteemed by the American Indians, who carefully collect and convert it into BREAD, or other culinary dishes. Hence LINNÆUS recommends its culture in situations abounding with reeds, and producing no other useful plant.

END.

INDEX

To the Latin Names of Plants, Animals, Minerals, Diseases, and other subjects occurring throughout this Work.

ACARUS Asiro, Common Mite; *A. baccarum*, Red Spider.

Accipenser Sturio, Sturgeon.

Acer campestris, Common Maple; *A. Pseudo-platanus*, Sycamore-tree; *A. saccharinum*, Sugar-Maple.

Achillea Millefolium, Common Yarrow; *A. Ptarmica*, Sneezewort Yarrow.

Aconitum Napellus, Large Blue Wolf's-bane.

Acorus Calamus, Sweet Flag.

Actæa spicata, Herb Christopher.

Adonis autumnalis, Antumnal Pheasant's Eye.

Adoxa Moschatellina, Tuberous Moschatel.

Æesculus Hippocastanum, Common Horse Chesnut; [*Æ. Pavia*, Scarlet; *Æ. Flavia*, Yellow; *Æ. Alba*, *Æ. Spicata* flowering.]

Æthusa cynapium, Fool's Parsley; *Æ. Meum*, Spignel.

Agaricus, Mushroom; *A. campestris*, Champignon; *A. canthavellus*, Chanterelle Mushroom; *A. cinnamomeus*, Brown Mushroom; *A. clypeatus*, Long-Stalked Mushroom; *A. muscarius*, Fly-killing Mushroom; *A. orcades*, Meadow Mushroom; *A. Quercinus*, Agaric of the Oak; *A. semi-globatus*, Semi-globular Mushroom; *A. violaceus*, Violet-coloured Mushroom.

Agrimonia Eupatoria, Common Agrimony.

Agrostemma Githago, Corn Cockle.

Agrostis Spica-venti, Silky Bent-grass; *A. stolonifera*, Creeping Bent-grass.

Aira aquatica, Water Hair-grass; *A. caryophallea*, Silver Hair-grass; *A. cespitosa*, Turfy Hair-grass; *A. flexuosa*, Heath Hair-grass.

Ajuga, Bugle, *A. chamæpithys*, Ground-pine; *A. reptans*, Common Bugle.

Alauda arvensis, Common Sky-lark; *A. arborea*, Wood-lark.

Alcea rosea, Holly-Hock.

Alsedo ispida, Common King-fisher.

Alchemilla vulgaris, Common-Ladies-mantle.

Alisma Plantago, Great Water Plantain.

Allium, Garlic; *A. Ascalonicum*, Eschallot; *A. Cepa*, Onion; *A. oleraceum*, Streaked Field-garlic; *A. porrum*, Leek; *A. Schænoprasum*, Chive; *A. ursinum*, Broad-leaved Garlic.

Aloe Caballina, Fetid, or Horse aloe; *A. Hepatica*, Common, or Barbadoes Aloe; *A. perfoliata*, Socotrine Aloe.

Alopecurus agrestis, Slender Fox-tail-grass; *A. bulbosus*, Bulbous Fox-tail-grass; *A. pratensis*, Meadow Fox-tail-grass.

Alsine media, Common Chick-weed.

Althaea officinalis, Marsh-Mallow.

Alumina, Pure Clay.

Alyssum sativum, Gold of Pleasure.

Amaurosis, Gutta Serena.

Ammodytes tobianus, Sand-eel.

Ammonia pura, Caustic Vegetable Alkali.

Amomum, Ginger; *A. cardamomum majus*, Greater Cardamom; *A. C. minus*, Lesser Cardamom; *A. zinziber*, Common Ginger.

[*Ampelis garrulus*, Cherry-bird.]

Ampelites, Canal Coal.

Amygdalus, Almond-tree; *A. communis*, Common Almond-tree; *A. Persica*, Peach.

Amylum, Starch.

Amyris gileadensis, Balm of Gilead Tree.

Anagallis arvensis, Scarlet Pimpernell.

Anarrhicas Lupus, Sea-Wolf.

Anas anser, Goose; *A. a. ferus*, Wild Goose; *A. a. mansuetus*, Tame Goose; *A. boschas*, Duck; *A. creca*, Teal; *A. cygnus ferus*, Wild Swan; *A. c. mansuetus*, Tame Swan; *A. ferina*, Widgeon.

Anchusa semper virens, Evergreen Alkanet, or Bugloss; *A. officinalis*, Greater Garden Bugloss; *A. lutea*, Yellow Alkanet; *A. tinctoria*, Dyer's Alkanet.

Anemone, Wind-flower; *A. Alpina*, Blue Mountain Anemone; *A. nemorosa*, Wood-Anemone; *A. pratensis*, Dark-flowered, or Meadow Anemone; *A. pulsatilla*, Pasque-flower; *A. ranunculoides*, Yellow Wood-Anemone.

Anethum fœniculum, Common Fennel.

Angelica Archangelica, Garden Angelica; *A. sylvestris*, Wild Angelica.

Anguis fragilis, Blind-worm.

Anthemis cotula, Fetid Chamomile; *A. nobilis*, Common Chamomile; *A. tinctoria*, Ox-eye Chamomile.

Anthericum calyculatum, Marsh Spider-wort.

Anthoxanthum odoratum, Sweet-scented Spring-grass.

Antirhinum, Snap-dragon; *A. Elatine*, Fluellin; *A. Linaria*, Toad-flax; *A majus*, Greater Snap-dragon; *A. Orontium*, Calf's-snout.

Anthyllis, Kidney-Vetch; *A. vulneraria*; Ladies-finger.

Aphanes arvensis, Parsley-piert.

Aphis, Plant-louse.

Aphthae, Thrush.

Apis, Bee.

Apium, Parsley; *A. graveolens*, Celery; *A. Petroselinum*, Common Parsley.

Aquilegia vulgaris, Common Columbine.

Arabis thaliana, Common Wall-cress.

Aranea Calycina, Garden Spider; *A. domestica*, Common House Spider.

Arbutus, Strawberry-tree; *A. Alpina*, Mountain Strawberry-tree; *A. Unedo*, Common Strawberry-tree; *A. Uva ursi*, Bear-berries.

Arctium Lappa, Burdock.

Ardea major, Heron; *A. stellaris*, Bittern.

Areca catechu, Fassel-nut; *A. oleracea*, Cabbage Palm.

Arenaria marina, Sea-spurrey Sandwort.

Argilla, Clay; *A. aerata*, aerated Argile; *A. apyra*, Porcelain Clay; *A. Lithomarga*, Fuller's Earth.

Aristolochia Clematitis, Slender Birthwort; *A. longa*, Long Birthwort; *A. rotunda*, Round Birthwort.

Arnica montana, German Leopard's-bane.

Arrachis Hypogaios Americanus, Ground-Nuts.

Artemisia, Mugwort; *A. Absinthium*, Common Wormwood; *A. dracunculus*, Tarragon; *A. mariti-*

ma, Sea Wormwood; *A. vulgaris*, Common Mugwort.
Artocarpus, Bread-fruit-tree.
Arum maculatum, Wake Robin.
[*A. Tryphyllum*, Indian Turnip.]
Arundo, Reed; *A. arenaria*, Matweed; *A. calamagrostis*, Small Reed; *A. epigeios*, Wood Reed; *A. phragmites*, Common Reed.
Asarum Europæum, Asarabacca.
[*Asclepias Syriaca*, Swallow wort.]
Aspalathus, African Broom.
Asperugo procumbens, Catch-weed.
Asperula odorata, Sweet Wood-roof.
Asphodelus luteus, Common Yellow Asphodel; *A. ramosus*, Branching Asphodel.
Asplenium, Spleenwort; *A. Scolopendrium*, Hart's-tongue; *A. Trichomanes*, Common Maiden-hair.
Aster Tripolium, Sea Star-wort.
Astragalus, Milk-Vetch; *A. glycyphyllos*, Common Milk-Vetch: *A. Tragacantha*, Tragacanth-tree.
Atriplex hastata, Wild Orache; *A. laciniata*, Frosted Orache; *A. littoralis*, Grass Orache; *A. portulacoides*, Shrubby Orache.
Atropa Bella donna, Deadly Nightshade; *A. mandragora*, Mandrake.
Avena, Oat: *A. elatior*, Tall Oat-grass; *A. fatua*, Bearded Wild Oats; *A. flavescens*. Yellow Oat; *A. nuda*, Naked Oat; *A. pratensis*, Meadow Oat; *A. pubescens*, Rough Oat; *A. sativa*, Common Oat; *A. stipiformis*, Skegs.

Balæna mysticetus, Common Whale.
Ballota nigra, Black Horehound.
Barytes, Ponderous Spar.
Bellis perennis, Common Daisy.
Berberis vulgaris, Common Berberry.
Beta, Beet; *B. albissima*, Mangel-wurzel; *B. hortensis*. Common White Beet; *B. maritima*, Sea Beet.
Betula, Alder-tree; *B. alba*, Common Birch; *B. alnus*, Common Alder-tree; *B. lenta*, Canada Birch; *B. nana*, Dwarf Alder-tree.
Bidens cernua, Nodding Marygold.
[*Bignonia Catalpa*, *B. Sempervirens*, *B. Crucigera*, *B. radicans*.]
Blatta orientalis, Eastern Cockroach.
Boletus, Spunk; *B. hirsutus*, ShaggySpunk; *B. igniarius*, Touchwood.
Borago, *officinalis*, Common Borage.
Botrytes, Cauliflower.
Brassica, Cabbage; *B. alpina*, Savoy; *B. campestris*, Field Cabbage; *B. Eruca*, Rocket; *B. Monensis*, Isle-of-Man-Cabbage; *B. muralis*, Wall Cabbage; *B. Napus*, Rape; *B. oleracea*, Sea-colewort; *B. rapa*, Turnip.
Briza media, Common Quaking Grass.
Bromelia ananas, Common Pine-apple.
Bromus mollis, Soft Brome-grass; *B. pinatus*, Spiked Heath Brome-grass; *B. Secalinus*, Smooth Rye Brome-grass, [or cheat.]
Bryonia alba, White Bryony.
Bubon gummiferum, Gum-bearing Macedonian Parsley.
Bunium bulbo-castanum, Great Earth-nut; *B. flexuosum*, Common Earth-nut.
Buxus angustifolia, Narrow-leaved Box; *B. semper-virens* Common Box; *B. suffruticosa*, Dutch Box.
Byssus candelaris, Yellow Powder-wort.

Cacalia suaveolens, Alpine Colt's-foot.
Cactus cochenillifer, Indian, Fig-tree.
Cadmia Fossilis, Calamine.
[*Calicarpa Americana.*]
Callitriche autumnalis, Autumnal Star-grass; *C. verna*, Vernal Star-grass.
Caltha palustris, Marsh-marigold.
[*Calycanthus floridus*, Sweet scented Shrub.]
Cambogia gutta, Gamboge-tree.
Campanula glomerata, Clustered Bell-flower; *C. latifolia*, Giant-Bell-flower; *C. rapunculoides*, Creeping Bell-flower; *C. rapunculus*, Rampion Bell-flower; *C. rotundifolia*, Round-leaved Bell-flower.
Cancer, Lobster; *C. crangon*, Shrimp; *C. grammarus*, Common Lobster; *C. major*, Common Crab; *C. squilla*, White Shrimp.
Canis, Dog; *C. avicularius*, Spaniel; *C. Graius*, Greyhound; *C. sanguinarius*, Blood-hound; *C. terrarius*, Terrier; C. *villaticus*, Mastiff; *C. vulpes*, Fox.
Cannabis sativa, Common Hemp.
Cantharides, Spanish Fly.
Capparis spinosa, Common Caper.
Capra Hircus, Common Goat.
Cardamine pratensis, Common Ladies-smock
Cardialgia, Heart-burn.
Cardium, Cockle.
Carduus acaulis, Dwarf Thistle; *C. Benedictus*, Blessed Thistle; *C. lanceolatus*, Spear-Thistle; *C. marianus*, Milk-Thistle; *C. tomentosus*, Woolly-headed Thistle.
Carex acuta, Slender-spiked Seg; *C. arenaria*, Sea-Seg; *C. vulpina*, Great Seg.
Carlina vulgaris, Common Carline Thistle.
Carpinus Betulus, Common Horn-beam-tree.
Carthamus tinctorius, Common Safflower.
Carum carui, Common Caraway.
Caryophyllus aromaticus, Clove-tree.
Cassia, Cassia; *C. fistula*, Purging Cassia; *C. Senna*, Senna.
[*Cassine*, *Youpon*, South-Sea-tree.]
Castor, Beaver; *C. fiber*, Common Beaver; *C. mochatus*, Water-rat; *C. zibethicus*, Musk-rat.
Cavia cobaya, Guinea Pig.
Centunculus minimus, Bastard Pimpernell.
Cephalalgai, Head-ach.
Cerussa, White Lead.
Cervus, Deer; *C. Dama*, Fallow Deer; *C. Elaphus*, Stag.
Chaerophyllum sylvestre, Wild Chervil; *C. temulentum*, Rough Chervil, [*C. arborescens.*]
Charadrius Pluvialis, Common, Plover.
Chelidonium, Horned Poppy; *C. corniculatum*, Red Horned Poppy; *C. majus*, Greater Celandine.
Chenopodium, Goose-foot; *C. album*, White Goose-foot; *C. Bonus Henricus*, Perennial Goose-foot; *C. maritimum*, Sea Goose-foot; *C. olidum*, Stinking Goose-foot; *C. polyspermum*, Upright Blite, [*C. viride botrys*, Cut leaved; *C. aristatum awned*, *anthelmisticum*, wormseed Jerusalem oak.]
Chlorosis, Green Sickness.
Chrysomela saltatoria, Turnip-fly.
Cicada, Flea-locust.
Cichorium, Succory; *C. Endivia*. Endive; *C. Intybus*, Wild Succory.
Cicuta virosa, Long-leaved Water Hemlock.
Cinchona, Peruvian Bark-tree; *C. Brachycarpa*, Dwarf Bark-tree; *C. Caribaea*, Jamaica Bark-tree; *C. Floribunda*, St. Lucia Bark-tree; *C. officinalis*, Peruvian Bark-tree;

C. Triflora, Triple-flowered Bark-tree.
Cistus creticus, Cretan Rock-Rose.
Citrus, Citron; *C. Aurantium*, Orange; *C. Decumana*, Giant Citron; *C. Lima*, Lemon-tree; *C. Medica*, Citron-tree.
Clematis Vitalba, Traveller's Joy, [*C. Crispa* Virgin's bower.]
Clupea, Herring; *C. alosa*, Shad; *C. encrasicolus*, Anchovy; *C. harengus*, Herring; *C. sprattus*, Sprat.
Coccinella, septem-punctata, Lady-bird.
Coccus Cacti, Cochineal Insect; *C. Hesperidum*, Green-house Bug; *C. Ilicis*, Kermes; *C. Lacca*, Gum-lac-insect; *C. malorum*, Apple-tree Coccus; *C. Phalaridis*, Canary-grass Coccus; *C. Polonicus*, Scarlet grain of Poland.
Cochlearia, Scurvy-grass; *C. Anglica*, English Scurvy-grass; *C. Armoracia*, Horse-radish; *C. Coronopus*, Common Wort-cress; *C. officinalis*, Common Scurvy-grass.
Cocos, Cocoa.
Coffea, Coffee-tree.
Colchicum autumnale, Meadow Saffron.
[*Collinsonia. Canadensis.*]
Coluber Berus, Common British Viper; *C. natrix*, Common Snake.
Columba œnas, Domestic Pigeon.
Comarum palustre, Purple Marsh-locks.
Conium maculatum, Common Hemlock.
Convallaria, Solomon's Seal; *C. Majalis*, Lily of the Valley; *C. multiflora* Common Solomon's Seal; *C. Polygonatum*, Sweet-smelling Solomon's Seal.
Convolvulus, Bindweed; *C. arvensis*, Small Bindweed; *C. Jalappa*, Jalap; *C. Scammonia*, Syrian Bindweed; *C. scoparius*, Bushy Bindweed; *C. sepium*, Great Bindweed; *C. soldanella*, Sea Bindweed; *C. Turpethum*, Turbith.
[*C. panduratus*, wild Potatoe.]
Conyza squarrosa, Flea-bane.
Copaifera Balsamum, Balsam of Copaiba-tree.
Corallina, Coral.
Coriandrum sativum, Common Coriander.
Cornus sanguinea, Wild Cornel-tree; *C. suecica*, Dwarf Cornel.
Corvus, Crow; *C. corax*, Raven; *C. corone*, Common Crow; *C. frugilegus*, Rook; *C. glandarius*, Jay; *C. monedula*, Jack-daw; *C. pica*, Mag-pye.
Corylus, Hazel-nut-tree; *C. avellana*, Common Hazel-nut-tree; *C. avellana fructu rotundo maximo*, Pound-nut; *C. Hispanica*, Spanish Hazel-nut-tree; *C. sativa*, Almond-nut; *C. sativa, fructu oblongo rubente maximo*, Blood-nut.
Costae, Ribs.
Crambe, Sea-Kale; *C. maritima*, Cliff-Cale.
Cratægus, Hawthorn; *C. Aria*, White-beam Hawthorn; *C. Oxyacantha*, White-thorn; *C. torminalis*, Wild Service-tree.
Crithmum maritimum, Rock Samphire.
Crocus, Saffron; *C. sativus*, Common Saffron; *C. vernus*, Spring, or Garden Crocus.
Crotolaria juncea, Chinese Hemp.
Croton tinctorium, Dyer's Wild Ricinus.
Cucubalus Behen, Spatling Poppy.
Cuculus canorus, Common Cuckow.
Cucumis, Cucumber; *C. anguria*, Water Melon; *C. colocynthus*, Coloquintida; *C. melo*, Common Melon; *C. sativa*, Common Cucumber.
Cucurbita, Gourd; *C. lagenaria*, Bottle-Gourd; *C. lignosa*, Lig-

neous-shelled Gourd; *C. Melo-pepo*, Erect Gourd; *C. Pepo*, pompion; *C. verrucosa*, Warted Gourd.

Culex, Gnat.

Cuminum Cyminum, Cummin.

Cupressus semper-virens, Common Cypress-tree.

Curculio granarius, Corn-chafer.

Curcuma longa, Long-rooted Turmeric; *C. rotunda*, Round-rooted Turmeric.

Cuscuta Epithymum, Lesser Dodder; *C. Europæa*, Greater Dodder.

Cyclamen Europæum, Sow-bread.

Cydonia Lusitanica, Portuguese Quince; *C. maliforma*, Apple Quince; *C. oblonga*, Oblong Quince.

Cynanche parotidæa, Mumps.

Cynara, Artichoke; *C. cardunculus*, Cardoon; *C. scolymus*, Garden Artichoke.

Cynoglossum officinale, Common Great Hound's tongue,

Cynomia, Dog-fly.

Cynosurus cristatus. Crested Dog's-tail-grass; *C. echinatus*, Rough Dog's-tail-grass.

Cyperus, Cyper-grass; *C. esculentus*, Eatable Cyperus; *C. longus*, Sweet Cyperus; *C. papyrus*, Paper Cyperus; *C. rotundus*, Round Cyperus.

Cyprinus alburnus, Bleak; *C. auratus*, Gold Fish; *C. barbus*, Barbel; *C brama*, Bream; *C. carpio*, Carp; *C. cephalus*, Chub; *C. leuciscus*, Dace; *C. rutilus*, Roach; *C. Tinca*, Tench.

Cystitis, Inflammation of the Bladder.

Cystisus laburnum, Broad-leaved Laburnum.

Dactylis glomerata, Rough Cock's-foot-grass [orchard grass;] *D. stricta*, Smooth Cock's-foot-grass.

Daphne Laureola, Spurge-Laurel; *D. Mezereum*, Mezeron.

Datura Stramonium, Common Thorn-Apple. [Jimson weed]

Daucus Carota, Common Carrot, *Delphinium consolida*, Wild Lark-spur; *D. Staphisagria* Stavesacre.

Delphinus phocæna, Dolphin.

Dianthus Armeria, Deptford Pink; *D. Barbatus*, Sweet William; *D. Caryophyllus*, Clove Pink; *D. Cæsius*, Mountain Pink; *D. Deltoides*, Maiden Pink; *D. prolifer*, Proliferous Pink.

Dictamnus Fraxinella, White Dittany.

Digitalis purpurea, Purple Foxglove.

Dioscorea bulbifera, Yam.

[*Diospyros Virginiana*, Persimmon.]

Dipsacus fullonum, Manured Teasel.

[*Dirca palustris*, Leather wood]

Dolichus pruriens, Couhage; [*D. Sinensis*, Chinese dolichos.]

Doronicum Pardalianches, Great Leopard's-bane.

Draba-verna, Common Whitlow-grass.

Dracæna Draco, Common Dragon-tree.

Drosera rotundifolia, Round-leaved Sun-dew.

Dyspepsia, Indigestion.

Echium vulgare, Common Viper's Bugloss.

Elymus arenarius, Upright Sea Lime-grass.

Emberiza citrinella, Yellow-hammer; *E. hortulana*, Ortolan.

Empetrum nigrum, Berry-bearing Heath.

Enteritis, Inflammation of the Bowels.

Epidendron Nectarium, Vanilla.

Epilobium angustifolium, Rose-bay Willow-herb; *E. hirsutum*, Great Hairy Willow-herb.

Equisetum arvense, Common Horse-tail; *E hyemale*, Rough Horse-tail; *E. palustre*, Marsh Horse-tail; *E. sylvaticum*, Wood Horse-tail.

Equus caballus, Common Horse; *E. Mulus*, Mule.

Erica vulgaris, Common Heath.

Erigeron Canadense, Canada Flea-bane.

Eriophorum; Cotton-grass; *E. angustifolium*, Common Cotton-grass; *E. polystachion*, Broad- leaved Cotton-grass; *E. vaginatum*, Hare's-tail Rush.

Eruca aquatica, Water Caterpillar; *E. sylvestris*, Wood Caterpillar.

Ervum hirsutum, Corn Vetch; *E. Lens*, Lentil.

Eryngium campestre, Field Eryngo; *E. maritimum*, Sea Eryngo.

Erysimum, Hedge-Mustard; *E. Alliaria*, Garlic Hedge-Mustard; *E. Barbarea*, Winter-cresses; *E. cheiranthoides*, Treacle–Hedge–Mustard; *E. officinale*, Common Hedge-Mustard.

Erysipelas, Rose.

Erysiphile, Mildew.

Esox Lucius, Pike.

Evonymus Europæus, Common Spindle-tree.

Eupatorium Cannabinum, Hemp Agrimony.

Euphorbia characias, Red Spurge; *E. Cyparissias*, Cyprus Spurge; *E. helioscopia*, Wart-wort.

Euphrasia officinalis, Eye-bright.

Faba Pichurim, Pichurim Beans.

Fagus, Beech-tree; *F. Americana*, American Chesnut-tree; *F. Castanea*, Chesnut tree; *F. Pumila*, Dwarf Chesnut-tree; *F. sylvatica*, Common Beech-tree.

Falco, Eagle; *F. æruginosus*, Moor Buzzard; *F. Buteo*, Buzzard; *F. chrysaetos*, Golden Eagle; *F. Cyaneus*, Hen-harrier; *F. Gyrfalco*, Jer-Falcon; *F. milvus*, Kite; *F. nisus*, Common Hawk.

Farina fecundans, Pollen.

Fasciola hepatica, Flewk-worm.

Felis Catus, Cat.

Ferula Asafœtida, asafœtida.

Festuca duriuscula, Hard Fescue-grass; *F. elatior*, Tall Fescue-grass; *F. fluitans*, Flote Fescue-grass; *F. myurus*, Wall Fescue-grass; *F. ovina*, Sheep's Fescue-grass; *F. pratensis*, Meadow Fescue-grass; *F. rubra*, Creeping Fescue-grass.

Ficus carica, Common Fig-tree.

Flos, Flower.

Fluxus umbilicus, Flux, or Sap-flow.

Fontinalis antipyretica, Greater Water-Moss.

Forficula auricularis, Ear-wig.

Formica, Ant.

Fragaria, Strawberry.

Fraxinus excelsior, Common Ash.

Fringilla, Finch; *F. cœlebs*, Chaffinch; *F. canaria*, Canary Bird; *F. carduelis*, Gold-finch; *F. domestica*, Sparrow; *F. linota*, Linnet; *F. spinus*, Siskin.

Fucus ciliatus, Fringed Sea-wrack; *F. esculentus*, Esculent Sea-wrack; *F. Palmatus*, Palmated Sea-wrack; *F. pinnatifidus*, Sweet Sea-wrack; *F. serratus*, Serrated Sea-wrack.

Fumaria officinalis, Common Fumitory; *F. solida*, Solid or Bulbous Fumitory.

Gadus eglesinus, Haddock; *G. merlangus*, Whiting; *G. morhua*, Cod.

Galanthus nivalis, Snow drop.
Galeobdolon luteum, Weasel-snout.
Galeopsis Tetrahit, Common Nettle-hemp.
Galium, Goose-grass; *G. aparine*, Cleavers; *G. Boreale*, Cross-leaved Goose-grass; *G. verum*, Cheese-Rennet.
Gasterosteus aculeatus, Common Stickle-back.
Gastritis, Inflammation of the Stomach.
Genista anglica, Needle-furze; *G. tinctoria*, Dyers' Green-weed.
Gentiana lutea, Common Gentian.
Geranium, Crane's-bill; *G. Robertianum*, Herb-Robert; [*G. Maculatum*, Crow-foot. Crane's-bill.]
Geum urbanum, Common Avens.
Gladiolus communis, Common Corn-flag.
Glaucium Phœnicium, Red Horned poppy.
Glaux maritima, Black Saltwort.
Glechoma Hederacea, Ground Ivy.
Glossitis, Inflammation of the Tongue.
Glycyrhiza glabra, Common Liquorice.
Gnaphalium Arenarum, Sandy Cudweed; *G. dioicum*, Mountain Cudweed; *G. Germanicum*, Common Cudweed.
Gossypium, Cotton-tree.
Gryllus, Cricket; *G. domesticus*, Common Cricket; *G. Gryllo-talpa*, Mole-cricket; *G. Locusta*, Locust.

Hæmatoxylum Campechianum, Logwood.
Hedera Helix, Common Ivy.
Hedysarum Onobrychis, Common Saintfoin.
Helianthus annuus, Common Sun-flower; *H. tuberosus*, Tuberous Sun-flower.
Heliotropium tricoccum, French Turnsol.
Helix hortensis, Common Garden Snail; *H. pomatia*, Red Garden Snail.
Helleborus, Hellebore; *H. fœtidus*, Fetid Hellebore.
Hepatitis, Inflammation of the Liver.
Heracleum angustifolium, Narrow-leaved Cow-parsnep; *H. Sphondylium*, Common Cow-parsnep.
Herbarium, Herbal.
Herniaria glabra, Smooth Rupture-wort.
Herpes miliaris, Ring-worm.
Hesperis inodora, Dame-wort.
Hieracium auricola, Narrow-leaved Hawkweed; *H. Pilosella*, Mouse-ear Hawkweed.
Hippobosca equina, Common Horse-fly, *H. ovina*, Sheep-fagg.
Hippophae rhamnoides, Sea Buckthorn.
Hippuris vulgaris, Common Mare's-Tail.
Hirudo Geometra, Geometrical Leech; *H. medicinalis*, Medicinal Leech; *H. sanguifuga*, Horse-Leech.
Hirundo rustica, Common Swallow; *H. urbica*, Martin.
Holcus, Soft-grass; *H. avenaceus*, Tall Oat-grass; *H. lanatus*, Meadow Soft-grass; *H. Sorghum*, Guinea Corn.
Hordeum cœleste, Wallachian Barley; *H. distichum* Summer Barley; *H. distichum nudum*, Large Naked Barley; *H. frutescens*, Bushy Barley; *H. hexastichon*, Six-rowed Barley; *H. maritimum*, Sea-barley; *H. murinum*, Wall Barley; *H. pratense*, Meadow Barley; *H. vulgare*, Common Barley; *H. Zeocriton*, Bearded Barley.
Humulus Lupulus, Common Hop.

Hyacinthus non-scriptus, English Hyacinth.

Hydragyrus, Mercury.

Hydrocephalus, Water in the Head.

Hydrocotyle vulgaris, Marsh Pennywort.

Hyoscyamus niger, Common Henbane.

Hypericum perforatum, Perforated St. John's Wort; *H. Androsæmum*, Tutsan.

Hyphocondriasis, Hypochondriac Affection.

Hyssopus officinalis, Common Hyssop.

Hystrix erinaceus, Common Hedge-hog.

Jassione montana, Sheep's-bit.

Jasminum humile, Dwarf Yellow Jasmine; *J. fruticans*, Shrubby Jasmine; *J. officinale*, Common Jasmine.

Jatropha, Cassada Plant; *J. elastica*, Caoutchouc; *J. Manihot*, Cassava.

Icterus, Jaundice.

Ichthyocolla, Isinglass.

Ileus, Iliac Passion.

Ilex Aquifolium, Common Holly-tree.

Impatiens noli-tangere, Balsamine.

Imperatoria Ostruthium, Common Masterwort.

Incubus, Nightmare.

Indigofera tinctoria, Indigo-plant.

Inula Helenium, Common Elecampane.

Iris fœtida, Stinking Flower-de-luce; *I. pseudacorus*, Water Flower-de-luce; *I. Xiphium*, Bulbous-rooted Flower-de-luce.

Isatis tinctoria, Wild Woad.

Isis nobilis, Red Coral.

Juglans regia, Common Walnut-tree.

Juncus conglomeratus, Round-headed Rush; *J. effuses*, Common Rush; *J. squarrosus*, Moss-rush.

Juniperus communis, Common Juniper-tree; *J. Lycia*, Lycian Juniper-tree; *J. sabina*, Savin.

Jynx torquilla, Wry-neck.

Kaempferia, Zedoary.

[*Kalmia*, Laurel.]

Lacerta agilis, Common Green Lizard.

Lactuca virosa, Wild Lettuce.

Lamium album, White Dead-nettle; *L. purpureum*, Red Dead-nettle.

Lapis Calaminaris, Calamine.

Lapsana communis, Common Nipple-wort.

Larus, Gull; *L. parasiticus*, Dung-hunter; *L. ridibundus*, Pewit.

Lathyrus, Chickling Vetch; *L. aphaca*, Yellow Vetchling; *L. latifolius*, Broad-leaved Vetchling; *L. pratensis*, Everlasting Tare; *L. sylvestris*, Narrow-leaved Everlasting Pea; *L. tuberosus*, Earth Nut.

Lavandula spica, Lavender-spike.

Lavatera arborea, Tree Mallow.

Laurus, Bay-tree; *L. æstivalis*. Deciduous bay; *L. Benzoe*, Benjamin-tree; *L. Camphora*, Camphor-tree; *L. Cassia*, Base Cinnamon; *L. Cinnamomum*, Cinnamon-tree; *L. nobilis*, Evergreen Bay; *L. Persea*, Alligator Pear-tree; L. *Sassafras*, Sassafras-tree.

Lemna, Duck's-meat.

Leontodon Taraxacum, Common Dandelion.

Leonurus Cardiaca, Common Motherwort.

Lepidium latifolium, Dittander Pepperwort; *L. ruderale*, Narrow-leaved Pepperwort.

Lepra, Leprosy.

Lepus, Hare; *L. cuniculus*, Rabbit; *L. timidus*, Common Hare.

Lethargus, Lethargy.

Lichen, Liverwort; *L. aphthosus*, Green Ground-Liverwort; *L. barbatus*, Bearded Liverwort; *L. calcareus*, Calcareous Liverwort; *L. calicaris*, Beaked Liverwort; *L. caninus*, Ash-coloured Ground-Liverwort; *L. caperatus*, Wrinkled Liverwort; *L. cocciferus*, Scarlet-bearing Liverwort; *L. flavus*, Yellow-powder Liverwort; *L. Islandicus*, Esculent Iceland Liverwort; *L. omphalodus*, Dark-coloured Dyer's Liverwort; *L. parellus*, Craw-fish-eye Lichen; *L. plicatus*, Officinal Stringy Liverwort; *L. pulmonarius*, Lungwort Liverwort; *L. prunastri*, Common Ragged Hoary Liverwort; *L. pustulatus*, Spotted Liverwort; *L. Roccella*, Orchal; *L. tartareus*, Large Yellow-saucered Dyer's Liverwort; *L. vulpinus*, Gold-wiry Lichen.

Lignum-vitæ officinale, Common Guaiacum.

Legusticum Scoticum, Scottish Lovage.

Lignstrum vulgare, Privet.

Lilium candidum, White Lily; *L. bulbiferum*, Fire Lily.

Limax, Slug.

Linum catharticum, Purging Flax; *L. usitatissimum*, Common Flax.

Liquid-ambar Styraciflua, Liquid Storax.

Liriodendron, Tulipifera, Tulip-tree.

Lithanthrax, Pit-coal.

Lithargyrum, Litharge.

Lithiasis, Stone.

Lithospermum arvense, Corn Gromwell; *L. officinale*, Common Gromwell.

Lobelia Dortmanna, Water Gladiole.

Lolium, Darnel; *L. arvense*, White Darnel; *L. bromoides*, Drank; *L. perenne*, Red Darnel; *L. temulentum*, Bearded Darnel.

Lonicera Periclymenum, Common Honey-suckle; *L. Xylosteum*, Upright Honey-suckle.

Lotus corniculatus, Common Bird's-foot Trefoil.

Loxia pyrrhula, Bullfinch.

Lumbricus, Earth-worm.

Lupinus albus, White Lupine.

Lycoperdon, Puff-ball; *L. aurantiacum*, Orange-coloured Puff-ball; *L. Equinum*, Equestrian Puff-ball; *L. proteus*, Common Puff-ball; *L. tuber*, Truffle.

Lycopodium clavatum, Common Club-moss; *L. selago*, Fir-leaved Club-moss.

Lycopus Europæus, Water Horehound.

Lysimachia nummularia, Creeping Loose-strife.

Lythrum hyssopifolium, Hyssop-leaved Loose-strife; *L. Salicaria*, Purple Loose-strife.

Magnesia alba, Magnesia; *M. nigra*, Manganese.

Malva crispa, Curled Mallow; *M. Mauritiana*, Mauritian Mallow; *M. Peruviana*, Peruvian Mallow; *M. sylvestris*, Common Mallow.

Mangofera, Mango-tree.

Mania, Madness.

Maranta comosa, Hairy Arrow-root; *M. galanga*, Galangal.

Marubium vulgare, Common White Horehound.

Matricaria chamomilla, Chamomile Feverfew; *M. parthenium*, Common Feverfew.

Medeola Virginica, cucumber-root.

Medicago, Medick; *M. falcata*, Yellow Medick; *M. lupulina*,

Trefoil-Medick; *M. sativa*, Lucern.
Melampyrum arvense, Purple Cow-wheat; *M. pratense*, Common Yellow Cow-wheat; *M. Sylvaticum*, Wood Cow-wheat.
Meleagris gallo-pavo, Turkey.
[*Melia Azederach*, Pride of China.]
Melica altissima, Lofty Melic-grass; *M. ciliata*, Fringed Melic-grass; *M. cærulea*, Purple Melic-grass; *M. nutans*, Mountain Melic-grass.
Melissa, Balm; *M. Calamintha*, Calamint; *M. officinalis*, Common Balm.
Melittis grandiflora, Purple and White Balm; *melissophyllum*, Reddish Bastard-Balm.
Meloe vesicatorius, Oil-beetle.
Menispermum, Moon-seed.
Mentha, Mint; *M. arvensis*, Corn-mint; *M. piperita*, Peppermint; *M. pulegium*, Penny-royal; *M. viridis*, Spear-mint.
Menyanthes trifoliata, Trefoil Buck-bean; *M. nymphæoides*, Fringed Buck-bean.
Mercurialis annua, French Mercury; *M. perennis*, Dog's Mercury.
Mespilus, Medlar; *M. Germanica*, Common Medlar-tree; *M. Oxyacantha*, White-thorn.
Mica alba, Pure Mica; *M. colorata martialis*, Coloured Martial Glimmer.
Miliaria, Miliary Fever.
Milium effusum, Millet-grass; *M. panicum*, Common Millet.
Mimosa, Sensitive Plant; *M. acacia*, Acacia; *M. Catechu*; Catechu; *M. Nilotica*, Egyptian Acacia.
Minium, Red-lead.
Mnium fontanum, Fountain Marsh-Moss.
Monarda Zeylonica, Indian Hore-hound.
Morus nigra, Common Mulberry-tree; *M. tinctoria*, Fustic.
Moschus moschiferus, Musk-bearing Animal.
Motacilla alba, White Wagtail; *M. flava*, Yellow Wagtail; *M. lucinia*, Nightingale; *M. rubecula*, Red-breast. *M. rubetra*, Whin-chat; *M. troglodytes*, Common Wren. [*M. ruticilla.*] *M. Sialis*, Blue-bird.
Mugil, Mullet.
Muræna Anguilla, Common Eel; *M. Conger*, Conger Eel.
Mus, Mouse and Rat; *M. arvalis*, Meadow-Mouse; *M. decumanus* Brown or Water Rat; *M. messorius*, Harvest-Mouse; *M. musculus*, Common Mouse; *M. rattus*, Common or Black Rat; *M. sylvaticus*, Long-tailed Field-Mouse.
Musca, Fly.
Mustela, Otter and Weasel; *M. foina*, Martin; *M. furo*, Ferret; *M. lutra*, Otter; *M. putorius*, Pole-Cat; *M. vulgaris*, Weasel.
Myrica gale, Sweet Gale.
M. cerifera, Candle-berry-Myrtle.
Myristica moschata, Nutmeg-tree.
Myroxylon peruiferum, Balsam of Peru-tree.
Myrtus communis, Common Myrtle.
Mytilus edilis, Eatable Muscle; *M. margaritiferus*, Pearl-bearing Muscle.

Narcissus pseudo-narcissus, Daffodil.
Nardus stricta, Small Matweed.
Narthecium ossifragum, Lancashire Asphodel. [*Nelumbium Speciossum.*]
Nepeta cataria, Cat-mint.

Nerium anti-dysentericum, Anti-dysenteric Rose-bay; *N. Oleander*, South-sea Rose; *N. tinctorium*, Dyer's Rose-bay.
Nicotiana Tabacum, Tobacco-plant; *N. minor*, English Tobacco.
Nopalleca, Indian Fig-tree.
Numida meleagris, Guinea-hen.
Nymphæa alba, White Water-Lily; *N. lutea*, Yellow Water-Lily; *N. Nelumbo*, Lily of the Volga.

Ocymum caryophyllatum maximum, Pink-scented Basil; *O. citriadore*, Citron-flavoured Basil; *O. vulgare*, Common Basil.
Oenanthe crocata, Hemlock-water Dropwort; *O. fistulosa*, Common-water Dropwort.
Oesophagus, Gullet.
Oestrus Bovis, Gad-fly.
Olea Europæa, Common Olive-tree.
Oleum Tartari per deliquium, Liquid Vegetable Alkali.
Oneirodynia activa, Sleep-walking.
Oniscus asellus, Slaters.
Ononis arvensis, Rest Harrow.
Ophthalmia, Inflammation of the Eye.
Orchis mascula, Early Orchis; *O. morio*,, Meadow Orchis.
Origanum vulgare, Common Marjoram.
Ornithogalum luteum, Yellow Star of Bethlehem; *O. umbellatum*, Common Star of Bethlehem.
Ornithopus perpusillus, Common Bird's-foot.
Oryza sativa, Common Rice.
Orobus, Peazeling; *O. sylvestris*, Bitter Vetch; *O. tuberosus*, Heath Pea.
Osmunda regalis,, Osmund Royal.
Ostrea, Oyster.
Otis tarda, Bustard.
Otitis, Inflammation of the Ear.
Ovis, Sheep.
Oxalis Acetosella, Common Wood Sorrel.

Panax quinquefolium, Ginseng.
Panicum, Panic; *P. Crus-Galli*, Loose Panic-grass; *P. dactylon*, Creeping Panic-grass; *P. miliaceum*, Millet; *P. sanguinale*, Cock's-foot Panic-grass; *P. verticillatum*, Rough Panic-grass; *P. viride*, Green Panic-grass.
Papaver Album, White Poppy; *P. Argemone*, Prickly Poppy; *P. Rhæas*, Red Poppy.
Papilio Brassicæ, Cabbage Butterfly.
Paralysis, Palsy.
Parietaria officinalis, Pellitory of the Wall.
Paris quadrifolia, Herb Paris.
Parulis, Gum-boil.
Pastinaca sativa, Common Wild-Parsnep.
Pavo cristatus, Peacock.
Pedicularis palustris, Marsh Lousewort; *P. sylvatica*, Common Lousewort.
Perca fluviatilis, Common Perch.
Peripneumonia, Inflammation of the Lungs.
Pestis, Plague.
Petroleum, Fossil Pitch; *P. asphaltum*, Pure Fossil Pitch; *P. induratum*, hardened Rock Oil; *P. montana impura*, Pis-asphaltum.
Petromyzon, Lamprey; *P. Bronchialis*, Lampern; *P. fluviatilis*, Lesser Lamprey; *P. marinus*, Sea Lamprey.
Phalæna, Moth; *P. Bombyx Mori*. Silk-worm; *P. Bombyx Neustriæ*, Lackey-Moth.
Phalaris, Canary-grass; *P. arundinacea*, Painted Lady-grass;

P. canariensis, Manured Canary-grass.
Phaseolus, Kidney-Bean.
Phasianus Colchicus, Common Pheasant; *P. Gallus*, Cock and Hen.
Phellandrium aquaticum, Water Hemlock.
Phleum nodosum, Knotty Timothy-grass; *P. pratensis*, Common Timothy-grass.
Phoca vitulina, Common Seal.
Phœnix dactylifera, Palm-tree.
Phthisis pulmonalis, Pulmonary Consumption.
Picris echioides, Common Ox-tongue.
Picus minor, Least-spotted Wood-pecker; *P. viridis*, Green Wood-pecker.
Pimpinella, Anise; *P. magna*, Great Burnet Saxifrage; *P. Saxifraga*, Common Burnet Saxifrage.
Pinguicula vulgaris, Common Butter-wort.
Pinus, Pine-tree; *P. Abies*, Spruce-Fir; *P. Cedrus*, Cedar; *P*, *Cembra*, Arvenusly: *P. Larix*, Larch-tree: *P. Picea*, Yew-leaved Fir: *P. Pinea*, Stone-pine: *P. pineaster*, Wild-pine: *P. sylvestris*, Scotch Fir.
Piper, Pepper; *P. Cubeba*, Cubebs; *P. nigrum*, Black Pepper.
Pistacia, Pistachia; *P. lentiscus*, Mastich-tree; *P. terebinthus*, Pistachia-tree.
Pisum maritimum, Sea-Pea; *P. sativum*, Common Pea.
Plantago Coronopus, Buck's horn Plantain; *P. lanceolata*, Rib-wort Plantain; *P. major*, Greater-Plantain; *P. maritima*, Sea Plantain.
Platanus occidentalis, Western Plane-tree; *P. orientalis*, Eastern Plane-tree.
Pluritis, Pleurisy.
Pleuronectes flesus, Flounder; *P. limanda*, Dab; *P. maximus*, Turbot; *P. platessa*, Plaise; *P. solea*, Soal or Sole.
Plumbago, Black Lead.
Plumbago Europæa, European Lead-wort.
Poa annua, Annual Meadow-grass; *P. aquatica*, Reed Meadow-grass; *P. compressa*, Flat-stalked Meadow-grass; *P. maritima*, Sea Meadow-grass; *P. pratensis*, Smooth-stalked Meadow-grass; *P. trivialis*, Roughish Meadow-grass.
Podagra, Gout.
Polygala, Milk-wort; *P. Seneka*, Rattle-snake Root; *P. vulgaris*, Common Milk-wort.
Polygonum, Snakeweed; *P. aviculare*, Knot-grass Snakeweed; *P. Bistorta*, Great Bistort; *P. Convolvulus*, Climbing Buck-wheat; *P. Fagopyrum*, Buck-wheat; *P. hydropiper*, Water-pepper; *P. tataricum*, Siberian Buck-wheat; *P. vivaparum*, Small Bistort.
Polypodium, Polypody; *P. Filix-mas*, Male Fern; *P. Oreopteris*, Heath Polypody; *P. vulgare*, Common Polypody.
Polytrichum commune, Great Golden Maiden-hair.
Populus alba, White Poplar; *P. balsamifera*, Carolina Poplar; *P. fastigata*, Po-Poplar; *P. nigra*, Black Poplar; *P. tremula*, Trembling Poplar.
Portulaca oleracea, Common Purslane.
Potamogeton natans, Broad-leaved Pond-weed.
Potentilla, Cinquefoil; *P. anserina*, Silverweed; *P. argentea*, Hoary Cinquefoil; *P. fruticosa*, Shrubby Cinquefoil; *P. reptans*, Common Cinquefoil.
Poterium Sanguisorba, Upland Burnet.

Primula, Primrose ; *P. Polyanthus*, Polyanthus ; *P. veris*, Cowslip ; *P. vulgaris*, Common Primrose.

Prunella vulgaris, Common selfheal.

Prunus, Plum-tree ; *P. Armeniaca*, Apricot-tree ; *P. Cerasus*, Common white Cherry ; *P*, *domestica*, Common Plum-tree ; *P. insititia*, Bullace Plum ; *P. Padus*, Bird-cherry ; *P. spinosa*, Sloetree.

Psittacus, Parrot.

Psora, Itch.

Pteris aquilina, Female Fern.

Pterocarpus santalinus, Red Sandal Wood.

Pulex, Flea.

Pulmonaria Officinalis, Common Lungwort.

Punica granatum, Common Pomegranate-tree ; *P. nana*, Dwarf American Pomegranate.

Pyrus, Apple and Pear-tree ; *P. Aria*, White-beam Hawthorn ; *P. aucuparia*, Quicken-tree ; *P. communis*, Pear-tree ; *P. Cydonia*, Quince-tree ; *P. domestica*, True Service-tree ; *P. hybrida*, Bastard Mountain Ash ; *P. malus*, Crabtree.

Quassia, *amara*, Bitter Quassia ; *Q. Simarouba*, Simarouba.

Quercus, Oak ; *Q. Ægilops*, Large Prickly cupped Spanish Oak ; *Q. cerris*, Smaller Prickly cupped Spanish Oak ; *Q. coccifera*, Coccus-bearing Oak ; *Q. esculus*, Beach-oak ; *Q. Robur*, Common Oak ; *Q. suber*, Cork-tree.

Raja, Ray-fish ; *R. aspera*, Rough Ray ; *R. batis*, Skate ; *R. clavata*, Thornback ; *R. pastinaca*, Sting Ray ; *R. torpedo*, Electric Ray.

Rallus aquaticus, Water-rail ; *R. erex*, Land-rail.

Rana, Frog ; *R. Bufo*, Toad ; *R. esculenta*, Eatable Frog ; *R. temporaria*, Common Frog.

Ranula, a swelling on the Tongue.

Ranunculus, Crowfoot ; *R. acris*, Butter-cup ; *R. aquaticus*, Water Crowfoot ; *R. arvensis*, Corn Crowfoot ; *R. auricomus*, Sweet Wood Crowfoot ; *R. bulbosus*, Bulbous Crowfoot ; *R. ficaria*, Pilewort , *R. Flammula*, Lesser Spearwort ; *R. lingua*, Greater Spearwort ; *R. sceleratus*, Round-leaved Water Crowfoot.

Raphanus, Radish ; *R. Raphanistrum*, White-flowered, or Jointed Charlock ; *R. sativus*, Common Radish.

Reseda lutea, Base-Rocket ; *R. luteola*, Yellow-weed, or Dyer's-weed.

Rhamnus catharticus, Purging Buckthorn ; *R. Frangula*, Alder Buckthorn.

Rheum palmatum, Palmated-Rhubarb ; *R. rhaponticum*, Common Rhubarb.

Rhinanthus. Crista-Galli, Yellow Rattle.

Rhodiola communis, Rosewort, the Yellow.

Rhus copallinum, Narrow-leaved Sumach ; *R. coriaria*, Elm-leaved Sumach ; *R. cotinus*, Yellow Sumach ; *R. typhinum* Virginian Sumach. [*R. glabrum*, Smooth Pennsylvania sumach ; *R. canadense*, *R. toxicodendron*, poison oak, *R. vernex*, Swamp sumach ; *R. radicans*, Poison vine.]

Ribes Alpinum, Sweet Mountain-Currant; *R. grossularia*,Rough Gooseberry ; *R. nigrum*, Black Gooseberry ; *R. reclinatum*, Red Gooseberry ; *R. rubrum*, Com-

mon Red Currant; *R. uva-crispa*, Smooth Goose-berry.

Ricinus communis, Castor-nut.

Robinnia pseudo-acacia, Acacia, the False.

Rosa arvensis, White-flowered Dog-rose; *R. canina*, Dog-rose; *R.centifolia*, Hundred-leaved Rose. *R. Gallica*, French Rose; *R. mundi*, Rose of the World; *R. rubiginosa*, Sweet Briar; *R. spinosissima*, Burnet Rose; *R. villosa*, Apple-Rose.

Rosamarinus officinalis, Rosemary; *R. o. angustifolia*, Narrow-leaved Rosemary; *R. o. latifolia*, Broad-leaved Rosemary.

Rubeola, Measles.

Rubia tinctorium, Wild Madder.

Rubigo, Rust.

Rubus arcticus, Dwarf Crimson Bramble; *R. cæsius*, Dew-berry Bush; *R. chamoemorus*, Cloud-berry; *R. corylifolius*, Hazel-leaved Bramble; *R. fruticosus*, Common Bramble; *R. Idæus*, Raspberry; *R. occidentalis*, Virginian Raspberry Bush; *R. odoratus*, Sweet-scented Raspberry; *R. saxatilis*, Stone Bramble.

Rumex acetosus, Common Sorrel; *R. acetosella*, Sheep's Sorrel; *R. acutus*, Sharp Dock; *R. aquaticus*, Water-Dock; *R. crispus*, Curled Dock; *R. obtusifolius*, Broad-leaved Dock; *R. sanguinarius*, Bloodwort.

Ruscus aculeatus, Common Knee-holly.

Ruta graveolens, Common Broad leaved Garden Rue.

Saccharum officinarum, Sugar-cane.

Sagina procumbens, Pearlwort, the Procumbent.

Sagittaria sagittifolia, Common Arrow-head.

Salicornia fruticosa, Shrubby Samphire; *S. herbacea*, Jointed Glasswort.

Salix alba, White Willow; *S. amygdalina*; Almond-leaved Willow; *S. Babylonica*, Weeping Willow; *S. capreata*, Sallow; *S. cinerea*, Sallow Willow; *S. fragilis*, Crack-Willow; *S. herbacea*, Herbaceous Willow; *S. pentandra*, Sweet Willow; *S. purpurea*, Rose Willow; *S. Rubra*, Red Willow; *S. triandra*, Smooth Willow; *S. viminalis*, Osier.

Salmo alpinus Charr; *S. eperlanus*, Smelt; *S. fario*, Trout; *S. salar*, Common Salmon; *S. Thymalus*, Umber, or Grayling.

Salsola fruticosa, Shrubby Saltwort; *S. kali*, Prickly Saltwort.

Salvia pratensis, Meadow Clary; *S. officinalis*, Common Large Sage; *S. tomentosa*, Balsamine Sage; *S. Verbenaca*, Wild English Clary.

Sambucus ebulus, Dwarf Elder; *S. nigra*, Common Elder.

Sanguis Draconis, Dragon's Blood.

Santalum album, Yellow, or White, Sanders.

Saponaria officinalis, Common Soapwort.

Satureia hortensis, Summer Savory; *S. montana*, Winter Savory.

Satyrium hircinum, Satyrion.

Saxifraga granulata, Saxifrage the Common.

Scabiosa arvensis, Field Scabious; *S. succisa*, Devil's-bit Scabious.

Scandix odorata, Cicely the Sweet; *S. Pecten*, Common Shepherd's Needle.

Scarabæus Melolontha, Chafer.

Schœnus mariscus, Rush-grass, the Prickly.

Scilla maritima, Common Squill.

Scirpus lacustris, Bull-rush; *S. maritimus*, Salt-marsh Club-rush; *S. palustris*, Marsh Creeping Club-rush.

Sciurus vulgaris, Common Squirrel.
Scleranthus annuus, Annual Knawell.
Scolopax arquata, Curlew; *S. gallinago*, Snipe; *S. rusticola* Woodcock.
Scomber Thunnus, Tunny.
Scrophularia nodosa, Great Figwort.
Scutellaria galeraculata, Common Scull-cap.
Secale sereale, Common Rye.
Sedum acre, Wall-pepper; *S. reflexum*, Yellow Stone-crop; *S. rupestre*, Rock Stone-crop; *S. Telephium*, Orpine Stone-crop.
Selinum palustre, Milk-weed, the Marsh.
Sempervivum tectorum, Common House-leek.
Senecio Jacobæa, Ragwort; *S. vulgaris*, Common Groundsel.
Sepia, Cuttle-fish.
Serratula arvensis, Corn Sawwort; *S. tinctoria*, Common Sawwort; [*S. spicata*.]
[*Sesamum*, Benne or Binny.]
Silene nutans, Notingham Catchfly.
Silex, Flint.
Sinapis alba, White Mustard; *S. arvensis*, Charlock; *S. nigra*, Common Mustard.
Singultus, Hiccough.
Sison Amomum, Common Bastard Stone-parsley.
Sisymbrium amphibium, Radish Water-cress; *S. Nasturtium*, Common Water-cress; *S. Sophia*, Flixweed Water-cress.
Sium angustifolium, Upper Water Parsnep; *S. latifolium*, Broad leaved Water Parsnep; *S. nodiflorum*, Creeping Water Parsnep; *S. sisarum*, Skirret.
Smilax sarsaparilla, Sarsaparilla.
Solanum, Nightshade; *S. Dulcamara*, Woody Nightshade; *S. Lycopersicon*, Love-apple; *S. nigrum*, Common Nightshade; *S. tuberosum*, Potatoe.
Solidago Virgaurea, Common Golden Rod. [*S. Cæsia*, Throatwort, Rattlesnake Golden-Rod.]
Sonchus arvensis, Corn Sowthistle; *S. oleraceus*, Common Sowthistle; *S. palustris*, Marsh Sowthistle.
Sorbus aucuparia, Quicken-tree; *S. domestica*, True Service-tree; *S. hybrida*, Bastard Mountain-ash.
Sparganium erectum, Greater Burweed.
Spartium junceum, Spanish Broom; *S. scoparium*, Common Broom.
Spergula arvensis, Corn Spurrey.
Sphacelus, Mortification.
Sphagnum palustre, Grey Bogmoss.
Sphinx, Hawk-moth.
Spinacea oleracea, Spinach.
Spiraea ulmaria, Meadow Sweet.
Spongia officinalis, Common Sponge.
Squalus Canicula, Spotted Shark; *S. Carcharias*, Great White Shark; *S. maximus*, Basking Shark.
Stachys, Woundwort; *S. palustris*, Clown's All-heal; *S. sylvatica*, Hedge-nettle Woundwort.
Statice Armeria, Common Thrift; *S. Limonium*, Lavender-Thrift.
Stannum, Tin.
Steatites, Soap-earth.
Strabismus, Squinting.
Strix flammea, Common Owl.
Struthio Camelus, Ostrich.
Sturnus vulgaris, Starling.
Styrax, Storax-tree; *S. Benzoe*, Benzoin; *S. officinalis*, Common Storax-tree.
Succinum, Amber.
Suffusio, mellita, Honey-dew.
Sus scrofa, Common Hog.
Swietenia, Mahogany.
Symphytum officinale, Common Comfrey.

Syncope, Swoon.
Syringa vulgaris, Common Lilac.

Taenia, Tape-worm.
Talpa Europaeus, European Mole.
Tamarindus Indica, Tamarind-tree.
Tamariscus, Gallica, French Tamarisk.
Tamus Africana, African Bryony; *T. cummunis*, Black Bryony; *T. Cretica*, Spotted Bryony of Crete; *T. racemosa*, Branched Bryony; *T variegata*, American Bryony.
Tanacetum vulgare, Common Tansey.
Taxus baccata, Common Yew-tree.
Teres, Round long Worm.
Termes pulsatorium, Death-Watch.
Testudo, Tortoise; *T. imbricata*, Hawk's-bill Tortoise; *T. midas*, Common Turtle.; *T. orbicularis*, Common River-Turtle.
Tetrao coturnix, Quail; *T. perdix*, Partridge; *T. tetrix*, Common Grouse; *T. urogallus*, Wood-cock.
Tettigoniae, Grasshoppers.
Teucrium chamaedrys, Common Germander; *T. marum*, Marum Germander; *T. scordium*, Water Germander; *T. scorodinium*, Wood Germander.
Thalictrum flavum, Common Meadow-Rue.
Thea Bohea, Black Tea-tree; *T. viridis*, Green-tea.
Theobroma cacao, Chocolate-tree.
Theriaca andromachi, Venice Treacle.
Thlaspi arvense, Smooth Mithridate Mustard; *T. Bursa pastoris*, Shepherd's Purse.
Thymus, Thyme; *T. Acinos*, Wild Basil; *T. serpyllum*, Common Thyme; *T. vulgaris*, Garden Thyme.
Tilia Europæa, Common Lime-tree.
Tinea capitis, Scald-head.
Tofieldia palustris, Marsh Spider-wort.
Toluifera balsamum, Balsam of Tolu-tree.
Tormentilla erecta, Common Tormentil.
Trachea, Wind-pipe.
Tragopogon porrifolium, Purple Goat's-beard; *T. pratense*, Yellow Goat's-beard.
Trapa natans, Water Caltrops.
Trifolium arvense, Hare's-foot Trefoil; *T. fragiferum*, Strawberry Trefoil; *T. medium*, Red, or Perennial Clover; *T. Melilotus*, Melilot-Trefoil; *T. pratense*, Common Clover; *T. procumbens*, Hop-Clover; *T. repens*, White-Clover,
Triglochin maritimum, Sea Arrow-grass; *T. palustre*, Marsh Arrow-grass.
Trigonella foenum-grecum, Fenugreek.
Tringa alpina, Dunling Sand-piper; *T. pugnax*, Ruff; *T. Vanellus*, Lapwing.
Triticum, Wheat; *T. aestivum*, Spring Wheat; *T. hybernum*, Winter-Wheat; *T. polonicum*, Polish Wheat; *T. repens*, Dog's Grass; *T. Spelta*, Spelt, or German-Wheat; *T. turgidum*, Thick-spiked Wheat.
Tuber cibarium, Truffle.
Tulipa Gesneriana, Common Garden Tulip; *T. sylvestris*, Wild Tulip.
Turdus merula, Blackbird; *T. musicus*, Throstle.

Turritis glabra, Smooth Tower-mustard.

Tussilago Farfara, Common Colt's-foot; *T. Hybrida*, Long-stalked Colt's-foot; *T. Petasites*, Butter-burr.

Typha angustifolia, Small Cat's-tail; *T. latifolia*, Great Cat's-tail.

Vaccinium myrtillus, Bilberry; *V. Oxycoccus*, Cranberry; *V. uliginosum*, Great Bilberry; *V. Vitis-Idæa*, Red Whortleberry.

Valeriana locusta, Corn Salad; *V. officinalis*, Great Wild Valerian.

Varicella, Chicken Pox.

Verbascum nigrum, Dark or Black Mullein; *V. Thapsus*, Great White Mullein.

Verbena officinalis, Vervain, the Common.

Veronica, Speedwell; *V. anagallis*, Narrow-leaved Pimpernell Speedwell: *V. Beccabunga*, Brook-lime; *V. Chamædrys*, Wild Germander; *V. officinalis*, Common Speedwell; *V. scutellaria*, Narrow-leaved Speedwell.

Vespa, Wasp; *V. coarctata*, Small Wasp; *V. Crabro*, Hornet; *V. Vulgaris*, Common Wasp,

Vespertilio, Bat.

Vicia, Vetch, or Tare; *V. Cracca*, Tufted Vetch; *V. faba*, Bean; *V. lathyroides*, Strangle Vetch; *V. sativa*, Common Vetch; *V. sepium*, Bush Vetch; *V. sylvatica*, Wood Vetch; *V. tuberosus*, Earth-nut, or Sow-bread.

Vinca minor, Lesser Perriwinkle.

Viola, Violet; *V. canina*, Dog's Violet; *V. odorata*, Sweet Violet; *V. tricolar*, Heart's Ease.

Viscum album, Common Misseltoe.

Vitis vinifera, Common Vine.

Ulex Europaeus, Common Furze.

Ulmus campestris, Elm Tree.

Ulva palmata, Palmated Sea-wrack.

Ureola elastica, Caoutchouc Vine.

Ursus, Bear; *U. arctos*, Black Bear; *U. lotor*, Raccoon; *U. luscus*, Wolverene; *U. maritimus*, Polar Bear; *U. moles*, Common Badger.

Urtica dioica, Common Nettle; *U. pilulifera*, Roman Nettle; *U. urens*, Lesser Stinging Nettle.

Urticaria, Nettle-rash.

[*Urva Ursi*, Bear berry.]

Xanthium Strumarium, Lesser Burdock.

Zanthoxylon, Prickly Yellow-wood.

Zea Mays, Maize.

Zizania aquatica, Water-Zizany.

Zostera Aloides, Water Aloe; *Z. marina*, Sea-grass-Wrack.

GENERAL INDEX OF REFERENCE

TO THE ECONOMICAL, MEDICAL, AND PHYSIOLOGICAL FACTS, DISPERSED THROUGH VARIOUS ARTICLES.

ABSORBENTS, see Chalk.

Abstergents, see Bee-glue.

Acid, the Marine; see Gout: its economical uses; see Bleaching—substances that yield vegetable acid. See Vinegar.

Acidity of the stomach, see Gentian.

Ague, relieved by snakeroot, Sage, gruel, bark, electricity, spiders, arsenic, avens, bistort, Coffee, Germander, Holly, Nux-vomica, Orache, Silver-weed, Sloe-tree, Stone-crop, Willow-bark, &c.

Air, how to purify. See Chamber, Evergreen, Wells, &c.

Alder, its use in fencing. See Fence.

Ale, to clarify. See Albumen, Common Burnet Saxifrage—to improve its flavour. See Fern.

Alkali, vegetable, may be obtained from Horse-chesnuts, Spanish Lilac, Beech-tree, Common Broom, Glass-wort, Grass-wrack, Arrow-grass, Goose-foot, Purslane, Orache, Sea-plantain, Tamarisk, Sea-holly, Stone-crop, Teasel, Artichoke, Thistle, Fern, Mugwort, &c.

Alum, substitute for, see Club-moss;—is also extracted from Shale.

[Anagallis, Pimpernel.]

Anchovies, substitutes for; see Sprat;—their management.

Animation, suspended; see Death, Drowning, Frost, Galvanism, Lightning, suspension by the Cord, &c.

Antidotes; see Coffee, Lead, &c.

Antiscorbutics. See Cloud-berry, Dame-wort, Radish, Fir-tree, Pepperwort, Scurvy-grass, &c.

Antiseptics. See Bilberry, Bistort, Buckthorn, Carrots, Cherries, Cucumbers, Fixed Air, Lemon, &c.

Antispasmodics. See Bismuth, Goosefoot, Musk, Zinc.

Aperients. See Anemone, Bryony, Burdock, Goose-grass, Madder, Radish, Sassafras, Strawberry, Tartar, Charcoal, &c.

Aphthæ, relieved by Borax, House-leek, &c.

Apoplexy. See Rosemary.

Apple-trees, to protect. See Insects.

Apricots, to increase their fertility. See Irrigation, Ivy.

Arrow-root. See Orchis.

Arsenic. See Antidote—danger of employing it in granaries. See Corn.

Artichoke, substitute for. See Milk-thistle.

Asparagus, substitutes for. See Black Bryony, Burdock, Goat's-beard, Hop, Swallow-wort.

Ass's Milk. See Catarrh.

Asthma, remedies for, see Anise,

Coffee; Daisy; Dame-wort; Galbanum; Garlic; Gum; Honey; Horehound; Ipecacuanha; Marum; Marsh-mallow; Mastic; Mustard; Orache; Oxymel of Squills; Sea-air; Zinc.

Astringents, see Alum; Catechu; Cornel-tree; Cudweed; Cypress; Daisy; Gall; Logwood; Peruvian-bark; Service-tree; Sloe-tree; [Geranium maculatum.]

Atrophy, causes of, see Consumption.

B.

Baking, difficulty of, and attention necessary in, see Bread.

Balls, pectoral, for horses, see Cough.

Banks, directions for making, see Earth-banks.

Barilla, vegetables from which it may be procured, see Salt-wort; Samphire, the Shrubby; Arrow-grass; Goose-foot; Grass-orache; Grass-wrack; Orpine, the Common; Artichoke; Eryngo; Sea-plantain; Teasel; Tamarisk.

Bark (Peruvian), useful in the Ague; a substitute for, see Avens; Willow; Germander; Horse-chesnut; Nettle.

Bark-worm, how to destroy, see Baring.

Barley-bread, useful in the Gout.

Barley and Oats, reason of their enormous prices, see Corn.

Barm, method of raising a bushel of flour, with a tea-spoonful of, see Baking.

Barometer; a natural one, see Spider.

Baskets, plants which may be manufactured into, see Birch-tree; Spanish Broom; Osier; Willow, &c.

Basket-work, see Bent-grass; Birch-tree.

Bayley's Patent Blacking; Recipe to make, see Blacking.

[Beans, See also Mazagan.]

Beef, method of preserving, see Flesh-meat; [Bene or Binny.]

Beer may be brewed from Buck-bean, without Malt, see Malt;. Juniper-tree; Bark;....... how to clarify, see Avens; Anise; Common Burnet Saxifrage; Brewing; bottled, how to improve, see Bottle; distempers of, see Brewing.

Bees, vegetables frequented by them, see Balm; Bugloss; Bell-flower; Bindweed; Blue-bottle; Briar; Spanish Broom; Alder-Buckthorn; Buck-wheat; the Climbing; Butter-cup; Borage; Lime-tree; Lupine; Self-heal; Sumach-tree, the Virginian; Sunflower; Thyme; Vetch;—advantageous food for, see Hawkweed; Heath; Acacia;—how to expel from their hives, see Mugwort.

Bellows, for bee-hives, description of, see Bee-hives.

Belly-ach, relieved by Castor-oil;—see also Colic, Tobacco, Zanthoxylon.

Bile, relieved by Columbo-root.

Bilious diseases, remedies for, see Acids.

Bird-lime, see Bread-fruit-tree.

Bite of a mad-dog, remedies for, see Eschallot; Liverwort; Pimpernel.

Black, Spanish, how made, see Cork.

Black-Canker, its devastation, how counteracted, see Caterpillar.

Black dyes, substances which yield, see Hemp-Agrimony; Ash; Bane-berries; Bugle; Burnet the Great; Agaric; Christopher the Herb; Cinnamon; Liverwort; Logwood; Loose-strife Scull-cap; Sumach-tree; Verdigrease.

Black-thorn, its uses, see Fence.

Blisters, substances used for, see

Butter-cup; Spanish Flies; Mustard-seed; Vinegar; Horse-radish; Crow-foot; Spurge-Olive.

Blite, to prevent, see Insects.

Blood-spitting, causes of, and remedies for, see Bleeding.

Blue Carmine, how made, see Molybdœna.

Blue dyes, vegetables which yield, see Ash; Blood-wort; Poppy, the Horned.

Blue Lake, how made, see Molybdœna.

Blue Pigments, plants which afford, see Blue bottle.

Boats, good timber for, see Alder-tree, [Mulberry.]

Bogs, how to clear, see Draining.

Bolsters, materials for, see Rabbit; Cat's-tail.

Books, old, how to restore to their original whiteness; see Bleaching.

Bow-strings and Fishing-lines, material for, see Aloe.

Brandy, vegetables from which it may be procured, see Carrots; Gooseberry; Plum-tree.

Brass, how composed, see Zinc.

Bread, how to detect adulterations in, see Alum;—substitutes for, see Acorns; All-heal; Arrow-head; Asphodel; Bean; Beech-nut; Bistort, the Small; Bran; Brome-grass; Bryony, the White; Buck-bean; Buck-wheat; Canary-grass; Clover; Club-rush, the Salt-marsh; Corn-flag, the Common; Couch-grass; Dog's-tail-grass, the Rough; Dropwort, the Common; Fern; Flote-Fescue-grass; Goosefoot, the White; Gromwell; Guinea Corn; Hay; Knot-grass; Lentil; Lime-grass; Lily, the Yellow and White Water; Maize; Marsh-Marigold; Matweed; Meadow-sweet; Millet; Pease; Pile-wort; Reed, the Common; Rocket; Seg, the Sea; Silver-weed; Solomon's-Seal; Sorrel, the Common; Spinach; Spurrey; Star of Bethlehem; Strawberry; Succory; Turnip-rooted-Cabbage; Vetch; Wake-Robin; Water Caltrops; Wheat-grass; Yam; Zizany.

Breath, fetid, relief for, see Cherry; Fasel-nut.

Breathing, shortness of, relieved by Æther.

Broth, recipe for making, see Diet.

Brown dyes, vegetables which yield, see Aloe; Asarabacca; Avens; Purging Buck-thorn; Buck-thorn, the Sea; Buck-wheat; Comfrey; Dog-rose; Elder; Hops; Chesnut; Liverwort; Tamarisk, the German; [Brown Paint, see Paint.]

Bruises, excellent remedies for, see Arquebusade Water; Madder; Spermaceti; Spirit of Wine.

Bugs, to destroy, see Flower-de-Luce; Insects; Oil;—preservative against, see Christopher the Herb.

Buildings, how to preserve against Fire, see Fire-proof.

Bush-harrow, its uses, see Dibble.

Butter, substitutes for, see Bay-tree;—directions for making, see Churning;—for tinging, see Marsh-Marigold; [to preserve in summer, see Ice.]

Butterflies, plants most frequented by, see Soap-wort.

C.

Calculus, see Fixed Air.

Cancers, remedies for, see Arsenic; Toad.

Candles, useful materials for making, see Alum; Bees-wax; Gale; Gaot.

Camphor, method of obtaining in China, see Bay-tree.

Capers, substitute for, see Broom.
Capons, how made to rear chickens, see Hen.
Caprification, its utility, see Fig-tree.
Cardamons, their use in cookery, see Cauliflower.
Carminatives, see Coriander; Fennel.
Carmine, substitute for, see Anotta [Colours.]
Castile-soap, its use, see Corpulency.
Castor-oil, its uses, see Beaver; Copper; Iliac Passion.
Cataplasms, substances proper for, see Fenugreek; Hyssop; Mustard; Hemlock; Lily; Marsh-mallow.
Catarrh, remedies for, see Abstinence; Cough; Galbanum; Gum; Smoking; Whey.
Cathartics, see Antimony; Buckthorn; Rhubarb.
Cattle, directions for rearing, see Breeding;—indurated liver of, cured by Dog's-grass;—how to prevent from being hoven, see Clover;—remedy for the Flux in, see Herb-Robert;—method of killing in Portugal, see Slaughtering.
[Catterpillars, see also Fruit.]
Cautery, a remedy for the Bite of a Mad-dog.
Cement, see Birch-tree; Blood; Tarras; Garlic; [Mortar.]
Cephalics, see Rosemary.
Chairs, material for stuffing, see Bull-rush.
Chalybeate Waters, see Indigestion; [Bristol waters.]
Chaps, remedy for, see Borax.
Charcoal, best materials for, see Beach-tree; Hazel-nut-tree; [maple.]
Cheese, to preserve, see Sloe-tree.
Children, injudicious treatment of, for coughs, &c. see Expectorants.
China, how to mend, when broken or cracked, see Cement.
Chin-cough, see Musk.
Chocolate, substitute for, see Vine;—to improve its flavour, see Lime-tree; Anotta.
Chólera Morbus, may be produced by Ale.
Chronical disorders, see Electricity.
Citron dyes; see Chamomile; Cicely; Goose-foot; Needle-Furze.
Cloth, materials for, see Aloe; Bark; Broom; Hop; Saw-wort;—to clean, see Balls; Spots;—to render impermeable to moisture, see Water-proof.
Clysters, their use as an antidote for mineral poisons, see Copper;—for Horses, see Horse-medicines;—substances proper for, see Fenugreek; Mutton.
Coaches, close, bad effects of, on travellers, see Breathing.
Cocci how to destroy, see Hot-house, [Peach-fruit.]
Cochineal, substitute for, see Bane-berries.
Coffee, to improve, see Succory;—substitutes for, see Acorns; Beech-nut; Seeds of the Common Broom; Chesnut.
Cold, its effects on Vegetables, and method of preventing, see Frost.
Cold Bathing, directions for, see Bath.
Colds, symptoms of, and method of cure, see Catarrh; Olive-tree; Pitch.
Colic, symptoms of the, see Belly-ach;—remedies for, see Ammoniac; Cardamom; Castor-oil; Clary; Holly; Cascarilla—in Farriery, see Gripes.
Colours, vegetable, see Fruit-trees.
Combs, material for, see Box.
Complexion, delicate, how to preserve, see Freckles.

Compost, different kinds of, see Manure.

Consumption, a principal cause of, see Dancing ;....medicines for, see Arvenusly ; Birch-wine ; Hart-fell-water ; Hemlock ; Chickweed ; Colt's-foot ; Cucumber ; Daisy ; Fox-glove ; Issues ; Liverwort ; Oysters ; Phosphorus ; Sago ; Tortoise. [Mercury.]

Contagion, to prevent, see Olive-tree. [Acids.]

Copess, how to strengthen, see Hazel-nut-tree.

Corn, best method of storing, see Granary.

Corn-Marigold, how to extirpate, see Chalk.

Corns, the causes of, see Foot.

Corroborants, see Angelica ; Copaiba.

Corrosive Sublimate, remedy for the poison of, see Antidote.

Cosmetics, see Teasel ; Wake-Robin ; Benzoine, Bismuth, Fumitory.

Costiveness, remedies for, see Beet ; Charcoal ; Breath ; Prunes ; Sow-bread ; Cassia ; Flummery.

Cough, substances which relieve, see Dame-wort ; Fir-tree ; Galbanum ; Ground-Ivy ; Gum ; Hound's-Tongue ; Ipecacuanha ; Mastich ; Pectorals ; Pitch ; Squill ; Sulphur.

Counterpanes, material for making, see Poplar.

Cow-dung, its use as a medicament, see Bruises.

Cows, food for, see Common Burnet Saxifrage ; Burnet, the Upland ; Cow-parsnep ; Cow-wheat ; Cress ; Nettle ; Dodder ; Dyer's Green-weed ; Eye-bright ; Fescue-grass ; Feverfew ; Fools-parsley Fox-tail grass ; Furze ; Gold-of-Pleasure ; Goose-foot ; Goose-grass ; Gout-weed ; Hop ; John's-wort ; Lentil ; Meadow-grass ; Medick ; Melic-grass ; Milk-Vetch ; Oat ; Parsnep ; Pea ; Potatoes ; Quaking-grass ; Rye ; Sneeze-wort ; Sow-thistle ; Speedwell ; Spindle-tree ; Spurrey ; Wood-roof ; Yam ; &c....Causes, which affect the taste of their Milk, see Butter ; ....Directions for the choice of ; see Black Cattle....Remedy for the Consumption in, see Mullein.........when Sick, how to treat, see Distemper.

Cradles, materials for, see Birch-tree ; Osier ; Willow.

Cramp in the Stomach ; remedy for, see Bismuth.

Crickets, to destroy, see Lily, the Water.

Crimson Dye, see Dog's-grass ; Goose-grass.

Crops, on the rotation of, see Field.

Crossing of Breeds, its utility, see Cattle.

Crow-foot, see Blister.

Crows, their utility to Husbandmen, see Chafer.

Curl, on the causes and cure of, see Potatoes.

Cutaneous disorders, remedies for, see Anise ; Birthwort ; Dcok ; Elm-tree ; Lime ; Sponge ; Succory ; Sulphur....see also Cosmetics.

D.

Dairy, hints for its management, see Butter.

Damp, to prevent its noxious effects, see Flannel.

Daws, to destroy, see Jack-daw.

Deafness, remedies for, see Agitation ; Electricity.

Death, apparent, proper treatment for, see Drowning.

Debilitated persons, proper food

and management of; see Debility.

Demulcents, see Manna.

Deobstruents, see Bryony ; Penny-royal.

Detergents, see Copaiba ; Fir-tree ; Madder.

Diabetes, remedy for, see Lime.

Diaphoretics, see Ammonia; Antimony; Burdock ; Dame-wort ; Hartshorn ; Nightshade.

Diarrhœas, remedies for, see Berberries ; Cypress ; Deer ; Hartshorn ; Nutmeg ; Olibanum ; Opium ; Rhubarb ; Shepherd's-purse ; Spa-water ; Cascarilla.

Digestion, to promote, see Asafœtida.

Diseases of Bees, see Bee-hives ; of Dogs to treat, see Dog.

Dish, a wholesome vegetable one, to prepare, see Tulip.

Diuretics, see Burdock ; Fennel ; Fumitory ; Nettle ; Tobacco-plant. [*Serratulus spicata.*]

Dodder, to extirpate, see Flax.

Dolphin, or Bean-fly, to destroy, see Bean.

Dresses of females, in what respects injurious to health, see Climate.

Dropsy, remedies for, see Abdomen ; Anise ; Bay-tree; Broom; Bryony ; Dandelion ; Elm-tree ; Fox-glove ; Garlic ; Lily ; Milk-wort ; Orache ; Sea-air.

Drowning, a contrivance for preventing, see Bamboe-habit ; Cork-tree ; Spencer-Marine.

Dry Baths, their utility ; see Bath.

Ducks, their uses in destroying insects, see Black Canker.

Dung remedy for the inconvenience of, in Agriculture, see Arable Land....substitute for, see Compost.

Dyes, permanent ; see Dyeing.

Dyeing, see Leather ; Bismuth; Bramble ; Lime-tree ; Tutsan.

Dyspepsy ; remedy for ; see Zedoary.

Dysenteries, relieved by Cherries ; Cypress : Dock ; Hartfell-water ; Hound's-Tongue ; Mastich ; Nutmeg ; Nux Vomica ; Opium ; Quince-tree ; Rose-bay ; Service-tree Cascarilla.

E

Ear-ach, see Ear.

Ear-trumpets, their bad effects in Deafness, see Ear.

Ear-wigs, how to destroy, see Oil.

Earthen-ware, substitutes for lead, in finishing, see Glazing.

Eating, excessive, consequences of, see Brain ;—too fast, see Mastication.

Eels, how to catch, see Bobbing.

Eggs, whites of, see Albumen.

Emetics, see Club-moss ; Fox-glove ; Ipecacuanha ; Oxymel of Squills ; Spearwort ;—operation of, how to restrain, see Salt.

Epidemic Diseases, preservative against, see Flag.

Epilepsy, remedies for, see Dog's Violet ; Mushroom ; Night-shade, the deadly ; Phosphorus ; Zanthoxylon.

Errhine, see Sow-bread.

Eruptions caused by shell-fish, see Muscle ;—remedies for, see Chalk.

[Esparcet, see Grasses.]

Etiolation, its uses and disadvantages in vegetation, see Light.

Evacuations, how promoted, see Excretion.

Exercise, partial, consequences of, see Game.

Eye-lashes, inverted, how to treat, see Eye ; water, see Vitriol.

Eyes, affections of, how relieved, see Anemone; Antimony; Blisters; Buckthorn; Hair, &c.

F.

Famine, treatment for persons suffering under, see Hunger.
Farcy, see Asarabacca.
Farms, large, their consequences, see Poor.
Fawn-colour-dye, see Soot.
Fences, method of constructing, see Bank-fence;—materials for, see Plantation; Planting;—Mr. Bakewell's method of making, see Hedges.
Fevers, remedies for, see Seltzer-water; Abstinence; Barley; Butter-milk; Butter-burr; Camphor; Cherry; Cornel-tree; Hartshorn; Hop; Nitre; Phosphorus; Sassafras; Tartar; and Cascarilla.
Figs, see Gargle.
Filtering Machines improved, see Filtration.
Fire, plans for securing houses from, see Buildings.
Fish-broth, to prepare, see Broth.
Flannel, utility of, when worn next the skin, see Autumn.
Flatulency, remedies for, see Alum; Angelica; Asafœtida; Cardamon.
Flax, refuse of, its utility; see Fruit-trees;—substitute for, see Swallow-wort,
Fleas, to expel, see Savory.
Flies, to destroy, see Black-Fly; Fly; Mushroom; Oil.
Floor, composition for, see Blood;—for houses, best kinds of; see Fire;—for barns, method of constructing; see Barn-floors.
Flour, vegetables which yield, see Bread.
Flux, remedy for, see Cinnamon.
Fodder, see Acacia; (Acacia, the False.) Angelica; Bent-grass; Bird's-foot, Bistort; Soft Brome-grass; Buck-wheat; Burnet; Butter-burr; Cabbage; Canary-grass; Kale; Cinque-foil; Parsnep; Carrot; Serradilla; Potatoe; Maize.
Food, solid, a cause of diseases; see Climate.
Freckles, remedy for, see Albumen.
French-Bread, to prepare, see Bread.
Frog, for Horses, Mr. Coleman's artificial, see Shoe.
Frogs, how to extirpate, see Fumitory.
Frost-bitten parts, how to treat, see Cold.
Frosts and dew, how to protect plants against, see Fog.
Fruit, how to raise in winter, see Fruit-trees;—to protect from Insects, see Caterpillar;—a catalogue of the best, see Orchard;—how to rear, see Forcing and Nursery.
Fomentations, see Myrtle.
Fuel, see Coal-balls; Sunflower; and Tulip-tree.
Fumigation, see Sulphur-wort.

G

Galls, their uses, see Oak.
Gangrene, see Antiseptics, Dame-wort, Germander, Nitre, &c.
Gardens, new method of watering, see Kitchen-garden.
Gargles, see Cinquefoil; Fig-tree; Myrrh.
Gas, see Fixed Air.
Gastric Juices, its uses, see Mortification.
Giddiness, in sheep, remedy for, see Pimpernell.

Ginger, see Milk-weed.

Glass, see Grass-wrack ;—to join when broken, see Cement.

Gloves, materials for, see Larch-tree, Poplar, &c.

Goats, food for, see Brome-grass ; Purging Buckthorn ; Carline ; Chamomile ; Cheese-rennet ; Cherry ; Cinquefoil ; Colt's-foot ; Columbine ; Corn-cockle ; Currant-tree ; Dandelion ; Dyer's Greenweed ; Fescue-grass; Feverfew ; Fool's Parsley ; Furze ; Germander ; Gold of Pleasure ; Goose-foot ; Goose-grass ; Gout-weed; Groundsel; Hazel-nut-tree ; Juniper; Knawell; Ladies-Mantle; Ladies-Smock ; Lark-spur ; Lily ; Lovage ; Lousewort ; Lungwort ; Mare's-tail ; Marjoram ; Marsh-locks ; Matweed ; Meadow-grass; Medick ; Melic-grass ; Mother-wort ; Nightshade ; Oat ; Ox-eye; Primrose ; Quaking-grass ; Scabious the Field and Small ; Sloe-tree ; Snakeweed : Sneezewort ; Solomon's Seal ; Sow-thistle ; Speedwell; Spindle-tree ; Spurrey; Starwort ; Thrift ; Willow-herb ; Wood-roof, &c.

Gold-dyes, obtained from the Angelica, Artichoke, Buck-wheat, Fig-tree, &c.

Goose-dung, its uses as manure, see Dung.

Gout, see Germander ; Ground-pine ; Horehound ; Vichy-water, &c.

Grain, how to ascertain its relative value, see Corn ;—its proportion of flour in a bushel, see Flour ;—how to preserve, see Granary ; —how to clear from insects, see Corn-chafer.

Grass, proper time for moving, see Hay.

Grass-land, its fertility increased by a manure of Bones ;—its advantages for Pasture, see Cattle.

Grates, how set to prevent smoky chimnies, see Chimney.

Gravel, see Garlic, Onion, &c.

Grease, in horses, to remove, see Burnet, the Upland.

Green-dyes, vegetables from which they are prepared, see Anemone ; Asarabacca ; Bugloss ; Bird-cherry; Smooth Rye Brome-grass ; Purging Buckthorn; Buck-wheat ; Bell-flower ; Carp-gall ; Cheese-Rennet ; Clover ; Lily ; Liverwort ; Privet ; Reed ; Tansy ; Burnet the Great, &c.

Green Pigments, produced from Anemone ; Bell-flower ; Fleur-de-luce, Zinc, &c.

Greens, substitutes for, see Dead-nettle ; Nettle ; Nipple-wort ; &c.

Grub, to extirpate. See Caterpillar.

Gums, how to treat when ulcerated. See Gum-boil ; also Catechu, Dock, Lac, &c.

Gunpowder. See Cautery.

Gutta serena, relieved by Anemone.

Gut-tie, account of. See Calves.

H.

Hair, to restore on the head, see Baldness ; Box-tree ; Butterwort ; Myrtle, &c.

Hair-powder, materials for, see Beech-mast Oil, Comfrey, &c.

Hats, see Beaver ; Poplar; Seal, &c.

Hay, see Guinea-grass, Butter-cup, &c.

Head-ach, remedies for, see Æther ; Blisters ; Coffee ; Hair ; Leech ; Nutmeg, &c.

Heartburn, see Crab-fish, Lozenges, &c.

Heaths, how reclaimed, see Land.

Hedges, fence for, see Furze ;

Buckthorn the Sea; Hawthorn; Holly; Horn-beam-tree, &c.

Hedge-rows, how to make, see Oak.

Hemp, substitutes for, see Sunflower; Tree-mallow, &c.

Hives, improvements on, see Bee-hives.

Hoarseness, remedies for, see Cabbage, Olive-tree, &c.

Hogs, vegetables for fattening them, see Acacia; Acorns; Artichokes; Beech-nut; Buck-wheat; Butter-wort; Chickweed; Crowfoot; Dandelion; Dodder; Duck's-meat; Earth-nuts; Fern; Fescue-grass; Feverfew; Fool's-Parsley; Groundsel; Hawthorn; Hop; Meadow-sweet; Parsnep, the Water; Pea; Potatoes; Sea-waure; Sneezewort; Sow-thistle; Timothy-grass; Yarrow; &c.

Hoofs of Horses, fomentation for, see Scabious.

Hooping-cough, relieved by Asafœtida; see also Chin-cough, Penny-royal, &c.

Hops, the best kind for Beer, see Brewing;—substitutes for, see Asparagus; Broom; Buck-bean; Clary; Germander; Mugwort; Tansey, &c.

Horse-balls, on the use of, see Farriery.

Horse-dealers, see Badger.

Horse-dung, how to employ in gardens, see Hot-beds.

Horse-hoe, see Drilling.

Horse-radish, see Blister; its uses for the Skin, see Cosmetic.

Horses, cure for weeping eyes of, see Eye; food for, see Chamomile; Corn-cockle; Cornel-tree; Cow-parsnep; Currant-tree; Dyer's Green-weed; Eye-bright; Fescue-grass; Feverfew; Furze; Gold-of-Pleasure; Goose-foot; Goose-grass; Hazel-nut-tree; Hop; Ladies' Mantle; Lentils; Lovage; Matweed; Meadow-grass; Medick; Melic Grass; Mother-wort; Osier; Ox-eye; Parsnep; Pea; Potatoes; Rupture-wort; Rye; Sloe-tree; Snakeweed; Sneezewort; Speedwell; Spurrey; Starwort; Thrift; Timothy Grass; Willow-Herb; Woodroof; Wormwood.

Hot-beds, substance for making, see Oak.

Hounds, proper method of treating, see Greyhounds.

Houses, to prevent taking fire, see Country-houses, and Fire.

Hunger, to prevent, see Pea, the Heath.

Husbandry, the Drill, advantages of, see Drilling.

Hydrophobia, see Nightshade, the Deadly, [Anagallis Cantharides] Orache; Vinegar, &c.

Hypochondriacal complaints, relieved by Asafœtida; Balm; Orache; Sassafras.

Hysterics, remedies for, see Amber; Ammoniac; Angelica; Asafœtida; Beaver-oil; Cheese-Rennet; Clary; Mandrake.

I.

Jail Distemper, see Fever.

Jaundice relieved by Alum; Duck's-meat; Eggs; Ground-pine; Nettle; Ox-eye; Strawberry.

Jelly, a nutritious one, how to prepare, see Arrow-root; Mutton; Poplar; Rice.

Indigestion, relieved by Moffat Waters; Tunbridge-Water; &c.

Indigo, substitutes for, see Anise; Common Burnet Saxifrage, Trefoil, Acacia the False, &c.

Infection, to prevent, see Contagion; Olive-tree.

Inflammation, remedies for, see Duck's-meat; Excoriation; Houseleek; Squill.

Ink, black, vegetables which produce, see Bane-berries ; Blue-bottle ; Sumach-tree ;—Green, see Anemone ;—Sympathetic, see Yellow-ink.

Insects, best means of destroying, see Apple-tree ; Caterpillar ; Chafer ; Fir-tree ; Flour ; Fruit-trees ; Oat ; Coccus.

Ipecacuanha, substitutes for, see Asarabacca ; Herb-Paris, [Ipecacuanha.]

Iron-moulds, to remove, see Sorrel.

Isinglass, how to substitute for glue, see Glue.

Itch, ointment for, see Dock ; Elecampane ; Vitriol, [Tobacco,] &c.

K.

Kite, electrical, its construction and uses, see Lightning.

Knit, in cows, how to cure, see Cows.

L.

Lacker, purple, see Alkanet.

Lake, see Madder.

Lamp, see Bitumens.

Land, exhausted, how to recruit, see Arable Lands.

Lawns, how to make, see Grass.

Laxatives, see Daffodil ; Dock ; Flax ; Fumitory ; Manna ; Nightshade ; Peach-tree ; Rose, the Damask ; Violet.

Laxity, remedies for, see Betony ; Cardamom ; Cassia ; Catechu.

Lead, relief for the poison of, see Antidotes.

Leather, how to make waterproof, see Boot.

[Leather-wood, *Dirca Palustris*.]

Leaves, how to rear trees from, see Propagation.

Leeches, see Kidney.

Legs, crooked, to remedy, see Bandy-legs ;—pains in, removed by Blisters.

Lemons, a substitute for, see Berberries.

Leprosy, remedy for, see Elm-tree.

Libraries, how to preserve from Insects, see Book.

Lice, to destroy, see Butterwort.

Light, new method of obtaining, see Air.

Lightning, how to secure beds from, see Bed-room.

Lilies, effects of keeping them in bed-chambers, see Apoplexy.

Limbs, deformed, how produce see Distortion.

Lime, substitutes for, see Oyster-shells ; Infection ;—Water, its use in clarifying Malt-liquors, see Beer.

Liqueur, a delicious one, how made, see Quince-tree.

Liquid for restoring sour beer, and directions for preparing, see Beer.

Liquors, hot, cautions respecting them ; see Epilepsy.

Lobsters, to preserve, see Insects.

Locked-Jaw relieved by Castor Oil ; see also Jaw ; Opium.

Locust, how to destroy, see Caterpillar.

Longevity, how to promote, see Life.

Lozenges, see Mint.

[Lucerne, see grasses.]

M.

Magnesia, its use as an antidote, see Copper.

Mahogany, how to imitate, see Wood.

Maize, see Paper.

Malt, substitute for, see Maize ;—how to know the best kind of, see Brewing ;—liquors, their physical properties, see Beer.

Manna, see Bile.
Manures, see Arsenic; Ashes; Blood; Bones; Chalk-lands; Coal; Faggots; Gypsum; Horn; Insects; Leaves; Malt; Marle; [Peat;] Pigeon; Privies; Reed; Saw-dust; Sea-sludge; Sea-waure; Stickle-back, &c.
Manuscripts, &c. directions for preserving, see Deeds;—to copy, see Writing, and Letter.
Marble, to clean, see Alabaster.
Mats, material for making, see Bull-rush.
Mattresses, a valuable material for stuffing, see Moss.
Maturation, how promoted, see Fig-tree.
[Mazagan beans, to raise early in summer; see also Beans.]
Meadow-Land, to increase its fertility, see Ashes.
Mice, to destroy in Granaries, see Corn; Knee-holly; Mullein.
Milk, see Air; Anise; Burnet, the Upland; Cabbage; Salep;—skimmed, useful for preserving animal food, see Flesh-meat.
Milking, proper times of, see Cow.
Millet, substitute for, see Blite.
Mites, in grain, how to eradicate, see Corn.
Mock-Turtle Soup, how to make, see Turtle.
Moles, to disperse, see Garlic.
Mordore-dye, see Bistort the Great.
Mortar, composition for making, see building; [Cement.]
Mortifications, a specific for, see Antiseptics;—checked by the use of the Cautery.
Moths, see Arvenusly; Christopher the Herb; Insects; Lavender.
Mow-burnt, see Barley.
Mugwort, see Paper.
Mushrooms, substitutes for, see Arvenusly;—may be raised from the Poplar.
Musk, substitute for, see Moschatel.

N.

Nervous diseases, remedies for, see Balm; Blisters; Celery; Sage.
Nephritic disorders, relief for, see Birch-wine; Cyper-grass; Raisin-wine.
Nettle-seeds, their use in improving animal-hair, see Horse.
Night-air, its noxious influence, see Bed-time.
Night-caps, thick, consequences of wearing, see Head.
Nipples; chapped, cure for, see Borax.

O.

Oak bark, substitutes for, see Tanning.
Obstructions, see Madder; Sea-water.
Oil, how purified, see Charcoal; Sand;—afforded by the Angelica; Bay-tree; Beech-mast; Celery; Charlock; Cherry; Gale; Lilac; Orange; Privet; Rape; Ray-fish; Acacia; Sanders; Stickle-back; Sun-flower; Acorns; Bladder-nut-tree; Cornel-tree; Nettle; Nettle-Hemp;—of Olives, a preventive of infection, see Plague.
Oil-paint, substitutes for, see Paint.
Opium, substitutes for, see Hemp; Herb-Paris;—safe method of taking, see Acids;—its violent effects on the brain, see Anodyne;—externally good for wounds, rheumatisms, &c. see Anodyne; Mortification.
Orange, see Colour-making;—dyes, vegetables which yield, Sassafras; Bay-tree; Rhubarb; Liverwort.

Owls, use of, see Mouse.

Oxen, directions for the choice of, see Black Cattle;—for fattening, see Bullocks;—and Horses, comparative advantages of, in agriculture, see Horse.

P.

Packing, material for, see Moss.

Pain, violent, remedies for, see Anodyne.

Paintings, how to clean, see Picture.

Palsy, relieved by Opium, see Anodyne; Bay-trees; Blisters; Fir-tree; Phosphorus; Rosemary.

Paper, materials for, see Aloe; Bark; Bull-rush; Burdock; Cabbage Palm; Cotton; Cyper-grass; Nettle; Traveller's-Joy; Mallow; Tree-Mallow; Willow; Broom: Hop-bines; [Gunny-bag,] &c.; see also Book.

Papier-mache, see Amber.

Paste, for book-binders, to prevent worms, see Books;—substitute for, see Asphodel; Chesnuts.

Peach-colour dye, see Rose.

Pearl-white, Colour-making.

Pears, dwarf, method of producing, see Dwarf-trees.

Perfume, see Orange.

Perspiration, how to promote, see Bathing; Bath; Consumption;—profuse, how checked, see Soda.

Phlebotomy, see Blood-letting.

Phlegm, to attenuate, see Birthwort.

Pica, or longing, remedy for, see Sea-wrack.

Pickles, new, see Buck-bean; Caraway.

Pigeons, food for, see Vetch.

Pine-tree, the Scotch, its uses, and method of culture, see Fir.

Plants, treatment of, see Irritability;—proper for moist ground, see Draining;—best method of packing, see Exotics,—how to preserve with their natural freshness, see Herbal.

Plant-louse, see Hot-house.

Plasters, see Fir-tree; Olive-tree.

Plethoric individuals, rules for, see Diet.

Pleurisy, medicine for, see Milkwort.

Plough, the drill, see Drilling.

Poisons, antidotes for vegetable, see Acids;—for mineral, see Antidotes.

Ponds, how to stock, see Carp and Fish.

Pork, best method of salting, see Beef.

Posts, best substance for making, see Acacia; Larch-tree, &c.

Pot-ash, see Alkali, vegetable.

Potatoes, most economical method of cooking, see Steam;—utility of, as food, see Diet.

Pottage, recipe for making, see Diet.

Poultry, vegetables, &c. which fatten, see Acacia; Buckwheat; Chafer; Duck's-meat; Millet; Nettle; [Bignonia.]

Prints, see Bleaching.

Pruning, see Apple-tree.

Puddings, ingredient for, see Fescue-grass;—to improve, see Panada;—best method of dressing, see Steam.

Purgatives, see Bindweed; Buckthorn; Fox-glove; Jalap; Liverwort; Mandrake; Plum-tree; Scammony; Senna; Stone-crop.

Purple-dye, see Heath; Linen; Cornel-tree; pigments, vegetables which afford, see Bilberry, &c.

Putrefaction, how prevented, see Charcoal.

Putrid Diseases, see Fever.

Q.

Quinsy, remedies for, see Acacia; Anise; Cudweed.

R.

Rabbits, food for, see Milk-Thistle.

Rats, how to disperse, see Garlic; Granaries; Valerian.

Ravens, singular efficacy of their gastric juice, see Cancer.

Red Dyes, vegetables which afford, see Birch-tree; Bloodwort; Cheese-rennet; Goose-grass; Rhubarb; Sloe-tree; Sumach-tree; Madder; Marjoram; Mordants; [Gallium.]

Red-water, in Sheep, to remove, see Parsley. [R. frigerator.]

Rennet, substances for, see Butter-wort; Cheese-rennet.

Resin, see Poplar.

Rheumatism, relieved by Opium; see also Anodyne; Bagnio; Blisters; Bryony; Cajeput-oil; Camphor; Dock; Electricity; Fir-tree; Flax; Lac; Mineral Waters; Mustard; Pitch; &c.

Rice, substitute for, see Millet.

Rickets, remedy for, see Madder.

Ripple, see Clover.

Rock-salt, its advantage in pickling, &c. see Beef.

Roofs, fire-proof, how to make, see Reed.

Rope, materials for, see Aloe; Birch-tree.

Rose-pink, see colour-making.

Rot, in sheep, by what occasioned, and method of cure, see Cattle; Sundew; remedies for, see Buck-bean; Parsley; Salt; &c.

S.

Salad, vegetables which may be eaten as, see Avens; Bell-flower; Brook-lime; Burdock; Burnet; the Upland; Lungwort; improvement in, see Borage; Ox-eye.

Salt, see Beef; how to recover from Pickle, see Bacon; method of purifying, see Basket-salt; of Lemons, substitute for, see Sorrel; springs, indication of, see Star-wort; water, improved method of distilling, see Air.

Sap-green, how prepared, see Green.

Sapcnaceous Plants, which may be substituted for soap, see Burdock; Horse-chesnut; Orache; Soap-wort; Wake-Robin.

Sassafras, its use in brewing and distilling, see Bay-tree.

Scab, in Sheep, see Dock; Elecampane; Parsley.

Scald-head, remedy for, see Elecampane. [Melia.]

Scarlet Dye, see Liverwort.

Sciatica, see Rue.

Scouring, in cattle, see Calf.

Scurvy, remedies for, see Agrimony; Alum; Angelica; Anise; Cheese-rennet; Citron; Coffee; Colt's-foot; Garlic; Goose-grass; Lac; Salep; Sea-waure, &c.

Sea, to prevent its encroachments, see Lime-grass.

Secretions, to promote, see Savin; Scurvy-grass; Senna; Thistle. [Seneka root, see Polygala Seneka.]

Sheep food for, see Acacia Arrow-grass; Bell-flower; Bird-cherry; Bistort; Borecole; Buckthorn; Burnet; Catchweed; Catmint; Cheese-rennet; Cherry; Christopher the Herb; Cinquefoil; Colt's-foot; Corn-cockle; Cornel-tree; Corn-salad; Cow-wheat; Cress; Dodder; Dog's-tail-grass; Dropwort; Dyer's-green-weed; Eye-bright; Fescue-grass; Feverfew; Furze; Germander; Gold-

of-Pleasure; Goose-foot; Goose-grass; Goutweed; Hop; Horse-beans; House-leek; John's-wort; Juniper; Ivy; Knawell; Ladies Mantle; Ladies Smock; Lark-spur; Lentil; Lily; Lovage; Lungwort; Marjoram; Meadow-grass; Medick; Motherwort; Nightshade; Oat; Ox-Eye; Parsley; Parsnep; Pea; Plantain the Ribwort; Primrose; Quaking-grass; Rupture-wort; Rye; Safflower; Salt-wort; Scabious, the field, and small; Sloe-tree; Snake-weed; Sneezewort; Solomon's-Seal; Sow-thistle; Speedwell; Spindle-tree; Spurrey; Star-wort; Woodroof, Yarrow.

Shrubs, method of conveying from a distance, see Plant.

Silk-worms, food for, see Cowslip; Elm-tree.

Smoke of lamps, &c. how to collect, see Smoking.

Smut, how to cure, see Arsenic; Barley; Corn.

Snake, remedy for the bite of; see Ammonia. [Serpent. Potash.]

Soap, substitutes for, see Fuller's-Earth; Saw-dust. [Horse chesnut.]

Soporifics; see Dog's- Mercury.

Sore-throat, remedies for, see Abstinence; Elder tree; Fixed air.

Soups, ingredient for, see Fescue-grass; their injurious effects on invalids, see Beef-tea.

Spanish-flies, caution against the indiscriminate use of, see Blisters; —substitutes for, see Butter-cup; Crow-foot.

Spasmodics, see Opium.

Spinach, substitutes for, see Blite; Daisy.

Spine, see Distortion.

Spirits how to correct, see Charcoal;—afforded by the fruit of the Dog-rose; Guinea-corn; Hawthorn; Quicken-tree, &c.

Splinters, to promote the extraction of, see Needle, the Shepherd's.

Sprains, see Liniment; Spirit of Wine.

Spur in grain, remedy for, see Corn.

Stables, &c. how to purify, see Fumigation.

Staggers, in horses, to prevent, see Goats.

Starch, plants which afford, see Arrow-head; Arrow-root; Bryony, the White; Burdock; Comfrey; Pile-wort; Snow-drop; Solomon's-seal; Wake-robin, &c. [Indian Turnip; Horse-chesnut.]

Sternutatory; see Mustard, the Hedge.

Stings of insects, remedy for, see Bee; Gnat; Tar.

Stomachic, see Mugwort.

Strangury, see Gum-arabic.

Straw, see Thatching.

Styptics, see Agaric; Bistort; Gall; Puff-ball; Sheperd's-Purse; Sponge; Sumach-tree; Tourniquet, &c.

Sudorifics, see Diaphoretics.

Suffocation by vapour, treatment for, see Charcoal.

Sugar, substitute for, see Molasses.

Sulphur, see Lead.

Surfeit in horses, see Parsley.

Swallowing, difficulty of, how relieved, see Mezereon.

Sweet-meat, see Lemon.

Swellings, remedies for, see Fenugreek; Goose-grass; Holly; Nightshade, the Deadly; Ox-eye; Sea-water; Sponge.

Sympathetic-Ink, see Bismuth.

T.

Table-beer, recipe for making, see Beer.

Tanning, substitutes for Oak-bark in, see Angelica; Avens; Berberries; Birch-tree; Bistort the Great; Briar; Broom; Burnet the Great; Burweed; Clary; Dock; Feverfew; Horehound, the White; Larch-tree; Lavender-Thrift; Loose-strife; Myrtle; Silver-weed; Sloe-tree; Tormentil; Trefoil; Yarrow; [See Vegetable Substances.]

Tapioca, substitute for, see Orchis.

Tea, substitutes for, see Ash; Betony; Bilberry;—to make from Beef; see Beef-tea.

Teeth, purifier of, see Dock.

Test-stones, see Basaltes.

Thatch, how to render Fire-proof, see Moss.

Thistle, its use, see Paper.

Timber, to preserve from decay, see Beech-tree.

Tippling, see Clover.

Tobacco, substitutes for, see Buck-bean; Cudweed; Milk-weed; Pea, the Heath; Sumach-tree;—to improve, see Larkspur.

Tonics, see Bitters; Buckthorn, &c.

Tooth-ach, relieved, and cured by Æther; Agitation; Anemone; Cajeput-oil; Marjoram; Opium; Thyme, &c.

Touch-stones, see Basaltes.

Trees, best method of rooting up, see Berne-machine;—to defend from the injuries of Animals, see Diseases of Plants;—frost-bitten, how to recover, see Frost;—blasted, see Lightning;—injured, composition for, see Blight.

Trout, &c. how to carry alive to a considerable distance, see Fish.

Tulips, how to preserve, see Flower.

Tumors, see Swellings;—in horses, to discuss, see Poll-Evil.

Turf, guide in digging for, see Sundew.

Turnip-fly, how to extirpate, see Cabbage, and Fly.

U. V.

Vapours, mephitic, to disperse, see Vinegar.

Varnish, see Eggs;—vegetables, &c. which yield, see Aloe; Amber; Bitumens; Copal.

Veal and Lamb, how preserved in Germany, see Flesh-meat.

Vegetables, to keep; see Preservation; how to protect from cold, see Frost;—poisonous, how to deprive of their injurious quality, see Cassava;—when putrid, to correct, see Charcoal;—proper time of watering, see Cold.

Veneering, materials for, see Broom, the Common; Traveller's-Joy.

Venison, its properties as food, and best method of preparing, see Deer.

Vermifuges, substances proper for, see Fern; Gamboge; Liver-wort, the green-ground; Mulberry-tree; Sugar; Spurge-laurel; Tansy; Timothy-grass; [Melia, Tobacco.]

Vermin, to prevent their depredations, see Aloe; Oil;—in Cattle, remedy for, see Meadow Saffron.

Vigogne dye, see Bell-flower, Mezereon, &c.

Vinegar, vegetables whence it may be prepared, see Bramble; Citron; Quicken-tree;—an excellent article for making, see Grains.

Violet dye, see Rose.

Vulneraries, see Anemone; Daisy; Leadwort.

Ulcers, remedies for, see Anemone; Arsenic; Basilicon; Birth-

wort; Buckthorn; Cock-roach; Euphorbium; Louse-wort; Night-shade, the Deadly; Sorrel; Verdigrease;—how checked, see Cautery;—of the throat, remedies for, see Mustard, the Hedge.

Ultramarine, substitutes for, see Smalt.

Urine, discharge of, to prevent, see Squill;—retention of, efficacious remedies for, see Gourd; Ice; [Saw-wort; Polygonum.]

W.

Walls, cheap plaster for, see Cement.

Warm-Bathing, directions for, see Bath.

Warts, to destroy, see Ammonia; Poppy, the Horned.

Waste-Land, how to improve, see Moor.

Water, its utility to debilitated persons, when impregnated with ferruginous particles, see Baths;—to purify, see Alum;—salt, how to make fresh, see Sea-water;—its advantage as a beverage, see Drinking;—Colours, how to prepare, see Colour-making;—Level, see Irrigation.

[Water-proof, see Boot, Leather, Shoe.]

Wax, vegetables from which it is collected, see Bees.

Weights, and ponderous bodies, machine for raising, see Jack.

Wells, how to purify, see Air;—bad consequences of the present mode of lining them, see Bricks.

Wheat, best method of preserving, see Corn; Granary;—German method of blanching, see Barley;—sprouted, how to remedy, see Corn.

Wheel-drag, an useful one described, see Drag.

White-lead, substitutes for, see Paint, and Zinc.

Wicks for Candles, see Cotton-grass.

Wigs, pernicious consequences of Wearing, see Hair-powder.

Wine, to clarify, see Albumen; Alum; Common Burnet Saxifrage;—to improve its flavour, see Burnet, the Upland;—Vegetables which yield, see Alder-tree; Birch-tree; Bird-cherry; Bramble; Bilberries; Sycamore-tree; Quince-tree, &c.—bottles, see Bottle.

Wood, composition for preserving, see Board;—how to stain, see Mahogany;—to silver, see Bismuth;—to prevent the combustion of, see Alum.

Wood-caterpillars, how destroyed, see Caterpillar.

Wool, undressed, its use, see Moth;—best method of preserving, see Cloth;—substitute for, see Willow.

Wounds, of Horses, how to treat, see Horses;—remedies for, see Basilicon; Carolina-Poplar; Fir-tree; Needle, the Common Shepherd's; Opium.

Worms, to destroy, see Aloe; Box; Loose-strife; Mustard, the Hedge; [Calomel; Melia, &c.]

Writings, easy mode of Copying, see Letter.

Y.

Yarn, materials for, see Duck's-meat; Woundwort.

Yaws, see Limes.

Yeast, experiments to make artificial, see Fermentation.

Yellow-dyes, substances which

yield, see Acacia; Agrimony, the Common; Agrimony, the Hemp; Balsamine; Berberries; Birch-tree; Alder Buckthorn; Purging Buckthorn; Buck-wheat; Burdock, the Lesser; Chamomile; Crab-tree; Feverfew; Furze; Fustic; Gale; Golden-Rod; Herb-Robert; Horn-beam; John's-wort; Marigold; Moss; Mugwort; Nettle; Plum-tree; Poplar; Ragwort. [Hydrastis Canadensis, Oak, (Quercitron.]

*** The reader is requested to supply the occasional deficiencies, or omissions, by reverting either to the primary articles, or by consulting the Indices of Synonyms, &c. which are prefixed to each Volume.

THE END.

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AN

AMERICAN EDITION

OF

BLACKSTONE'S COMMENTARIES:

WITH

NOTES OF REFERENCE

TO

THE CONSTITUTION AND LAWS

OF THE

FEDERAL GOVERNMENT OF THE UNITED STATES,

AND OF THE

COMMONWEALTH OF VIRGINIA:

With an Appendix to each volume, containing Tracts upon such subjects as appeared necessary to form a Systematic View of the Laws of Virginia, as a member of the Federal Union.

BY St. GEORGE TUCKER,

Professor of Law in the University of WILLIAM AND MARY, and Chief Judge of the Court of Errors and Appeal in Virginia.

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